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MUNICIPAL, INDUSTRIAL AND DOMESTIC WATER SUPPLIES, POLLUTION ABATEMENT, PUBLIC HEALTH. OCHLOCKONEE BASIN

Public Health Service
Atlanta, Georgia

June 1962

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TECHNICAL MEMORANDA FOR WATER SUPPLIES POLLUTION ABATEMENT AND PUBLIC HEALTH

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PREPARED FOR
UNITED STATES STUDY COMMISSION, SOUTHEAST RIVER BASINS
BY
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE, REGION IV
WATER SUPPLY & POLLUTION CONTROL PROGRAM
ATLANTA, GEORGIA
JUNE 1962

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UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service, Region IV
Water Supply and Pollution Control Program

Technical Memoranda

for

Municipal, Industrial and Domestic Water Supplies
Pollution Abatement
Public Health

OCHLOCKONEE BASIN

Prepared for

United States Study Commission,
Southeast River Basins
Atlanta, Georgia
June 1962

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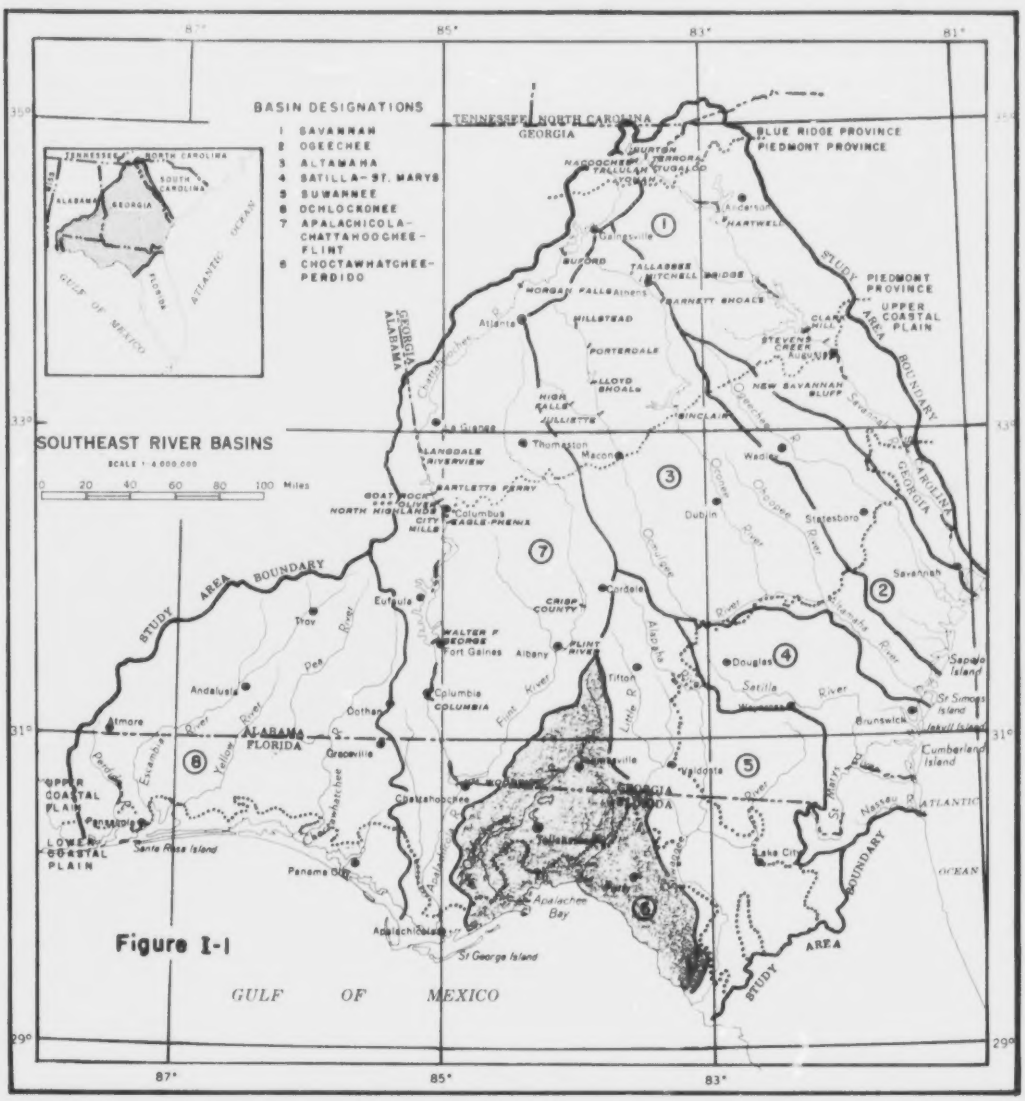


Figure I-1

U. S. Study Commission, Southeast River Basins
P. O. Box 953, Atlanta 1, Georgia

PREFACE

SCOPE

The U. S. Study Commission, Southeast River Basins, on December 30, 1959 and March 11, 1960, requested the assistance of the Public Health Service in:

(1) Formulating a domestic, municipal and industrial water supply plan, including pertinent economic studies,

(2) Formulating a water quality management plan including water pollution abatement and pertinent economic studies, and

(3) Formulating a plan for the protection of public health related to plans for the conservation, utilization, and development of land and water resources of the study area.

The Study Commission proposed that the Public Health Service compile the required basic data and prepare "single-purpose technical memoranda" on each of the above subjects and that these technical memoranda set forth the requirements for development to serve the above functions at present, in 1975, and 2000 in each of the eight river basins of the study area.

These memoranda on the Ochlockonee Basin have been prepared in fulfillment of the Commission's requests. They have been divided into three separate memoranda: MUNICIPAL, INDUSTRIAL, AND DOMESTIC WATER SUPPLIES; POLLUTION ABATEMENT; and PUBLIC HEALTH. In addition, a separate report has been prepared by the Public Health Service for the U. S. Study Commission: Water Quality Basic Data - Southeast River Basins, dated 1961. This report covers the Ochlockonee Basin as well as the seven other Basins within the U. S. Study Commission study area.

The purpose of these memoranda is to provide data and information to the U. S. Study Commission - SERB on the present and projected status of water supply, pollution abatement, and public health facilities and programs for use in the preparation of a comprehensive plan for the conservation, utilization, and development of the land and water resources of the Ochlockonee Basin.

AUTHORITY

The Study Commission's requests are in partial fulfillment of its obligation under Public Law 85-850 which states in part: "In carrying out the purpose of this Act it shall be the policy of Congress to utilize the services, studies, surveys, and continuing

investigational programs of the departments, bureaus, and agencies of the United States". The Act also states that the Commission may "secure directly from any executive department, bureau, agency, commission, office, independent establishment, or instrumentality, information, suggestions, estimates, and statistics for the purpose of this Act, and each such department, bureau, agency, board, commission, office establishment, or instrumentality is authorized to furnish such information, suggestions, estimates and statistics directly to the Commission, upon request by the Chairman or Vice Chairman".

The authority for the Public Health Service to undertake this study and the preparation and submission of these technical memoranda stems from the above and from the Public Health Service Act of 1944 (Public Law 410, 78th Congress) and its amendments; the Federal Water Pollution Control Act (Public Law 660, 84th Congress), and its amendments, Federal legislation on air pollution (Public Law 159, 84th Congress), with amendments; related miscellaneous provisions of other statutes; and the Public Health Service Regulations.

Public Law 85-850, under which the U. S. Study Commission operates, provides for investigations and studies and the preparation of a comprehensive and coordinated plan for the conservation, utilization, and development of land and water resources in the study area. In this plan formulation, the law specified, among other things, the inclusion of plans for:

(1) domestic and municipal supplies;

(2) Possibilities of industrial development and utilization;

(3) pollution abatement and the protection of public health; and

(4) other beneficial and useful purposes.

ECONOMIC BASIS FOR PLANNING

Projections for 1975 and 2000 in this report were made using estimates of economic development furnished to the Public Health Service by the U. S. Study Commission, Southeast River Basins. The pattern of the future economy stems mainly from projections of population, employment, and income furnished by the Commission. The basic aggregate projections for these three components are considered by the Commission to be relatively firm. The breakdown of the basic projections into their different components and the derivation of data for river basins is based, in some cases, on limited information. The Commission emphasizes that these are preliminary estimates and that the pattern of the projected economy should not be taken as a rigid goal but

should be considered flexible and subject to modification and refinement as the results of future studies become available.

RESPONSIBILITIES

The basic responsibility for the administration of Federal programs in municipal water supply, pollution control, and public health is vested in the Public Health Service. State programs and responsibilities are administered by the State health departments and water pollution control agencies. In the administration of these Federal and State programs, cooperation and assistance of other agencies with interests in these fields are obtained. The responsibilities and interests of all Federal, State, and local agencies in municipal water supply, pollution control and public health programs in the Ochlockonee Basin are enumerated below.

PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

The Public Health Service serves in a consulting capacity to other Federal agencies and to the State and local health departments on matters relating to water supply, water pollution control, vector control, and other matters related to public health; makes investigations and studies; does scientific research in the above fields; collects vital statistics; and operates certain medical care and quarantine programs. In protecting the public health, the Service is responsible for developing and recommending procedures for the prevention and control of mosquitoes and other vectors associated with Federal water development projects.

As part of its responsibilities under the Federal Water Pollution Control Act (Public Law 660, 84th Congress) as amended, the Service is required to prepare or develop in cooperation with other Federal agencies, State and interstate water pollution control agencies, municipalities and industries, comprehensive programs for eliminating or reducing the pollution of interstate waters and tributaries thereof and improving the sanitary conditions of surface and underground waters. In the development of such comprehensive programs, due regard is given to the improvements which are necessary to conserve such waters for public water supplies; propagation of fish and aquatic life and wildlife; recreational purposes; and agricultural, industrial, and other legitimate uses. The Service is further authorized to advise any Federal construction agency concerning the inclusion of storage in any proposed reservoir for regulations of stream flow for the purpose of water quality control.

The Public Health Service is authorized to make joint investigations, with any such agencies, of the condition of any waters in any State or States, and of the discharge of any sewage, industrial wastes, or substance which may adversely affect such waters.

Section 8 (a) of Public Law 660 states that "The pollution of interstate or navigable waters in or adjacent to any State or States (whether the matter causing or contributing to such pollution is discharged directly into such waters or reaches such waters after discharge into a tributary of such waters), which endangers the health or welfare of any persons shall be subject to abatement as provided in this Act."

The Public Health Service works closely with State agencies and makes investigations and studies relating to health and pollution control aspects of development programs pertaining to municipal, industrial, and domestic water supplies. The Service also has the responsibility of collecting and disseminating basic data on radiological, chemical, physical, and biological water quality and other information insofar as such data and information relate to water pollution and the prevention and control thereof.

CORPS OF ENGINEERS, DEPARTMENT OF THE ARMY

The Corps of Engineers operates the Federal program for the improvement and maintenance of rivers and other waterways in the interest of navigation and flood control. Water conservation and other water use functions beneficial to the public are considered in carrying out investigations and construction of water projects. Health matters relating to these projects include vector control, sanitation of work camps, recreation, water supplies, and water pollution abatement.

SOIL CONSERVATION SERVICE, DEPARTMENT OF AGRICULTURE

The Soil Conservation Service, under Public Law 566, 83rd Congress, as amended, prepares watershed work plans for small watersheds to assure water-flow retardation and soil erosion prevention. In the development of these work plans, consideration is given to water use functions beneficial to the people of the area, including irrigation, stock watering, and fish and wildlife propagation and municipal and industrial water supply. Control of insects around the watershed and use of water for domestic purposes are also given consideration.

FOREST SERVICE, DEPARTMENT OF AGRICULTURE

The Forest Service is responsible for the development and management of National Forests to preserve and increase the multiple benefits from these natural resources. Good forest management retards rapid runoff and prevents soil erosion, thus reducing pollution from natural sources. Sanitation of public facilities in National Forests is under the supervision of the Forest Service and privately operated facilities are regulated by use permits issued by the Service. It is to be noted, however, that Section 480, Title 16, U. S. Code states

that jurisdiction over persons within National Forests should not be affected by the reason of these forests' existence. Thus, health and sanitation in National Forests is of concern to State and local health authorities.

GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

The Geological Survey is primarily a fact-finding and research agency. It collects, analyzes, and interprets basic data on water, mineral, and land resources, and prepares topographic and geological maps and reports as a prerequisite to planning, constructing, and operating projects for the development and utilization of these natural resources.

NATIONAL PARK SERVICE, DEPARTMENT OF THE INTERIOR

The National Park Service administers programs for the National Parks, monuments, historic sites, and similar areas. It has the responsibility for maintaining sanitary and healthful conditions in these areas. The Service cooperates with other agencies in investigating the recreational possibilities at proposed reservoir projects and in planning for their protection, development, and utilization.

ATOMIC ENERGY COMMISSION

The Atomic Energy Act of 1954 authorizes the Atomic Energy Commission to regulate the use of certain radioactive materials and certain facilities which produce or use these materials, to protect against hazards to life or property. A National Committee on Radiation Protection, comprised of members of several Federal agencies including the Public Health Service and professional organizations, prepares recommendations on protection from radioactive substances.

FLORIDA STATE BOARD OF HEALTH

Rules and regulations for the betterment and protection of the public health of the State of Florida are included in the State's Sanitary Code (Chapter 381, Florida Statutes). The adoption, promulgation, and enforcement of this Code is the responsibility of the Florida State Board of Health. Among the 35 chapters of the Sanitary Code relating to the public health engineering and sanitation program of the State, there are included rules and regulations governing public water supplies, public sewerage systems, pollution of streams and waters, swimming pools and bathing beaches, impoundments, and private water supply wells.

Other statutes which are administered by the State Board of Health are the Tourist Camp Law (Chapter 513, Florida Statutes); The Nuisance Law (Chapter 386, Florida Statutes); Supervision by

the State Board of Health over Pollution of All Underground and Surface Waters in the State and Over Water Supplies, Sewerage Systems, Sewage Waste and Refuse Disposal Systems in the State (Chapter 381 and Chapter 387, Florida Statutes); Pollution of Waters (Chapter 387, Florida Statutes); The Swimming Pool Law (Chapter 514, Florida Statutes); and the Air Pollution Control Act (Chapter 403, Florida Statutes 1957).

The Board has the authority to issue permits and review plans and specifications for the installation, alteration or extension of a water supply or sewerage system, and refuse or sewage disposal facilities to serve more than 25 people. The Board is further authorized to enforce any provisions of the Sanitary Code; conduct experiments relating to the purification of water and treatment of sewage, waste or refuse; consult with and advise counties, municipalities and other persons as to source of water supply, methods of water purification, and disposal of drainage, sewage or refuse; to establish water purity standards for the streams of the State; and to control air pollution in accordance with rules and regulations adopted by the State Air Pollution Control Commission.

LOCAL HEALTH DEPARTMENTS (FLORIDA)

In Florida, local health departments are organized on a county, multicounty, or city-county basis. Health officers in charge of these local units are deputized agents of the State Health Officer for the purpose of carrying out the provisions of the Sanitary Code of the State. Local health departments have the power to enforce rules, regulations, orders, and ordinances regarding the public health in accordance with the State laws. Local health departments also have the power to make sanitary inspections and isolate, quarantine, and abate nuisances.

FLORIDA BOARD OF CONSERVATION

The State Board of Conservation, through its Department of Water Resources, advises the Florida State Cabinet on measures to conserve and promote wider use of water resources; advises and coordinates the efforts of local agencies, water control authorities, municipalities, counties, and individuals to achieve improved conservation, control, and use; and conducts an educational program to inform the public of sound State water resource policies and procedures.

FLORIDA GAME AND FRESH WATER FISH COMMISSION

The State Game and Fresh Water Fish Commission collects and compiles data of a biological and economic nature and recommends measures to mitigate losses or increases in the value of various water control structures to wildlife. The Commission also represents fish and wildlife interests in the planning of water resource projects.

(6/15/62)

FLORIDA GEOLOGICAL SURVEY

This Agency collects and compiles basic hydrological data on water resources of the state; locates uncontrolled flowing artesian wells and through the Water Resources Department cooperates with the U. S. Geological Survey on water surveys.

GEORGIA DEPARTMENT OF PUBLIC HEALTH

The State has retained all responsibilities and duties for the health of the public not otherwise granted to the Federal government in the Federal Constitution or by Acts of Congress. The State operates under the police power, inherent in the sovereign State to enact and enforce laws to protect and promote the health, safety, morals, order, peace, comfort, and general welfare of the people. Among the powers of the State Board of Health are the following:

1. Adopt rules, regulations, and orders.

2. Enforce State laws, regulations, and orders.

3. Isolate and quarantine, make sanitary investigations and inspections, and collect vital statistics.

4. Review plans and specifications for any new municipal water systems to be installed, or changes to be made in any existing system by any city, corporation, partnership, or individual.

5. Inspect the source of municipal water supply, and to determine if the water is impure and dangerous to individuals or to the public generally.

6. Act in a consultative capacity to local agencies.

7. Approve and regulate the impounding of waters as they affect insect and vector control.

The Georgia Water Quality Act (Laws of Georgia, 1957, Act No. 491) provides for the control of water quality within the State and the regulation of public water supply treatment facilities. It provides for the issuance of certificates to persons discharging or permitting to be discharged into the waters of the State any sewage, industrial wastes, or other wastes.

The Act declares it to be the policy of the State of Georgia that the water resources of the State shall be utilized prudently to the maximum benefit of the people without so impairing the quality of the water resources as to jeopardize public water supplies and public health, and without interfering unreasonably with beneficial

use of the water resources for recreation, fish and wildlife development, agriculture, and the industrial development of the State's natural resources and its manpower. The State water pollution control agency (State Board of Health) is charged with the responsibility, and has the authority to require the use of reasonable methods to prevent and control the pollution of the waters of the State.

The State Board of Health under the Water Quality Act, has the responsibility and power to, as it deems necessary, establish such standards of quality for any waters in relation to the reasonable and proper use thereof, and such general policies and standards relating to any existing or future pollution of such waters. The State Board of Health has the power to issue orders directing any particular person or persons to secure within the time specified therein, such operating results as are reasonable and practicable of attainment toward the control, abatement, and prevention of pollution of the waters of the State and the preservation of the necessary quality for the reasonable use thereof.

The State Board of Health has the power to establish such policies, requirements, and/or standards governing the source, distribution, purification, treatment and storage of water for public or community water supply systems as it deems necessary for the reasonable and proper use thereof in conformity with the intent of the Water Quality Act. The Act states that it shall be unlawful for any person to erect, construct, enlarge, extend, open, reopen, or operate any public or community water supply system including storage, distribution, purification treatment facilities or works, without having first secured from the Board approval of the source of water supply; the means and methods of treating, purifying and storing water; plans and specifications for the construction of facilities or works; and the operation thereof.

LOCAL HEALTH DEPARTMENTS (GEORGIA)

Georgia laws provide for the formation of county boards of health. These are created for the purpose of carrying out State rules, regulations, and orders as well as adopting other regulatory measures needed for protecting the public health within the local jurisdiction. Local Boards of Health in Georgia have the power to:

1. Adopt rules, regulations, and orders.

2. Enforce State laws, regulations, and orders.

3. Enforce local regulations and ordinances.

4. Make sanitary inspections and investigations, isolate, quarantine, and abate nuisances.

(6/15/62)

GEORGIA OIL AND GAS COMMISSION

The Georgia Oil and Gas Commission is authorized to make rules, regulations, and orders for the prevention of the pollution of fresh water supplies by oil, gas or salt water (1955 Cum. Supp., Title 43, Section 713).

GEORGIA GAME AND FISH COMMISSION

In the protection of fish and other aquatic life, the Georgia Game and Fish Commission is vitally interested in habitat waters. This agency cooperates with other State and Federal agencies in investigations and studies of water quality as related to fish and other aquatic life. This Agency enforces legislation against the use of explosives, poisonous substances, etc. for the purpose of catching, killing, taking or harming fish (1955 Cum. Supp., Title 45, Section 703).

GEORGIA WATER QUALITY COUNCIL

The Georgia Water Quality Council makes recommendations to the State Board of Health with regard to regulations, procedures, standards, waste disposal certificates, and policies governing public and community water supplies and waste disposal into waters of the State for controlling pollution and quality of such waters.

GEORGIA DEPARTMENT OF MINES, MINING, AND GEOLOGY

The Division of Conservation in this Department collects and compiles water resources data and cooperates with the U. S. Geological Survey, U. S. Soil Conservation Service, and State Soil Conservation Committee on surface and ground water surveys and chemical quality of waters.

GEORGIA RESOURCES COMMISSION

The Commission is responsible for inventorying the State's water resources and gathering such data as are necessary for determining what further legislation is needed with regard to quantitative control of the State's water resources. A State water engineer, appointed by the Commission is authorized to employ a water resources fact finding and research staff to be known as the Georgia State Water Survey.

WATER PURVEYORS

The general responsibility for the purity of water is shared by health authorities, water purveyors, owners of property, and water users. Those duties of health authorities and other agencies

have been presented. The purveyor of water must safeguard it while in the water supply system, with some overlapping responsibilities with the property owner once the water reaches the property line. Regulation controlling the manufacturing, importing or bottling of water in the Basin are administered by the Florida and Georgia State Boards of Health.

DESCRIPTION OF THE BASIN

GENERAL

The Ochlockonee Basin is bounded on the east by the Suwannee Basin, on the south by the Gulf of Mexico, on the west by the Apalachicola River Sub-basin, and on the northwest by the Flint River Sub-basin.

The Basin drainage area includes all the coastal areas between the Suwannee and Apalachicola Rivers. It lies entirely within the Coastal Plain Province and has an area of 6,329 square miles of which 5,078 are in Florida and 1,251 are in Georgia. The northern half of the Basin is in the Upper Coastal Plain which is characterized by low rolling hills and gentle slopes. Streams in this area meander through broad swampy valleys. The southern half of the Basin, in the Lower Coastal Plain, consists of nearly level plains. Much of this area consists of swampland, particularly near the streams. The rivers of the Basin carry a relatively light sediment load, although the waters of the southern portion of the Basin are highly colored due to leaching of organic material from poorly drained areas.

The Basin contains eleven rivers and their tributaries and numerous smaller creeks which drain directly to the Gulf.

The largest stream in the Basin, the Ochlockonee River, rises in Worth County, Georgia at an elevation of 420 feet and flows in a southwesterly direction across the Florida-Georgia boundary and into Lake Talquin. From the lake it makes a westerly semicircle then enters the Gulf of Mexico at Apalachee Bay. The major tributaries are the Little Ochlockonee River and Tired Creek in Georgia, and Little River, Telogia Creek and Attapulgus Creek in Florida. The Aucilla River rises in Thomas County, Georgia at an elevation of 250 feet and flows southerly across the state boundary to the Gulf. The river goes underground several places along its course. The principal tributary is the Wacissa River. The St. Marks River rises near Tallahassee, Florida and flows almost due south to the Gulf. The river goes underground near the Leon-Wakulla County line in a series of sinks but later emerges in a definite channel.

Other rivers in the Basin, all of which lie wholly within Florida and drain to the Gulf, are: the Econfina, the Carrabelle, the Fenholloway, the Steinhatchee, and the Sopchoppy. Tidal effects extend upstream about 25 miles on most of the rivers.

Lake Talquin is the only major reservoir in the Basin. This lake was formed by Jackson Bluff Dam and has a usable capacity of 69,560 acre-feet. The dam is owned and operated by a private utility company for generation of hydroelectric power. Operation of this dam causes wide fluctuations in daily flows in the downstream reaches of the Ochlockonee River. There is also a large number of small lakes, reservoirs, and farm ponds which have little effect upon stream flows.

CLIMATE AND HYDROLOGY

The climate of the area is mild, the mean annual temperature ranging from about 65°F in the north to 67°F in the south. The frost-free growing season varies from 250 days in Georgia to 280 days along the coast. The average annual rainfall varies from about 46 inches in the Georgia portion of the Basin to approximately 56 inches along the coast. The rainfall is fairly uniform throughout most of the year.

The 32-year flow record (1926-58) at the Ochlockonee River near Havana, Florida where the drainage area is 1,020 square miles, shows a 24-hour maximum discharge of 55,900 cfs, a minimum discharge of 17 cfs, and an average discharge of 934 cfs. This station is located above Talquin Lake and, therefore, is not affected by the power dam operations.

The Ochlockonee Basin lies within both the upper and lower Coastal Plain Provinces. The line dividing the two provinces extends roughly in an east-west direction and divides the Basin approximately in half. Although different in name, the geology of the upper and lower Coastal Plain Provinces is generally the same. Both are underlain by the principal limestone aquifer which is one of the most productive aquifers known.

The principal limestone aquifer consists mainly of hydraulically connected limestone beds. Above and below the aquifer are beds of low permeability that confine the water in the limestone. The upper confining bed is the Hawthorne clay formation and the lower bed is the McBean clay formation. The depth of the aquifer in the Basin varies from 100 to 600 feet and it is about 500 feet thick. There are no known cones of depression or areas of recharge of this aquifer in the Basin. Municipal ground water supplies in the Basin are obtained from the principal limestone aquifers.

POPULATION

The population of the Ochlockonee Basin, according to census data provided by the U. S. Study Commission, was 207,800 in 1960. This represents an increase of 25,300 or 13.9 percent over the 182,500 reported by the 1950 Census. The urban population (municipalities

of 2500 or more) increased 56.5 percent during the 1950-60 decade while the rural population decreased 7.5 percent.

There are six communities in the Basin which have populations greater than 2500. These are in Georgia, Cairo, 7,427; Pelham, 4,609; and Thomasville, 18,246; in Florida, Perry, 8,030; Quincy, 8,874; and Tallahassee, 48,174.

RESOURCES

The economy of the Basin is one of combined agriculture and industry with a slightly greater number of persons engaged in farming than in manufacturing. There are significant differences in the nature and extent of economic activities in the Georgia and Florida portions of the Basin. Although the Georgia portion comprises less than 25 percent of the Basin area, this portion has about 60 percent of the Agricultural employment and 45 percent of the manufacturing employment. The land resources are used principally for forestry in Florida and agriculture in Georgia. Leading income crops are forestry products, cotton, tobacco, peanuts, corn, and commercial truck crops.

Food processing and wood products and lumber are the most important industries of the Basin. These two industries account for about 60 percent of the 9,100 persons employed in manufacturing. The remaining employment is distributed among textiles, apparel, pulp and paper, and others.

Commercial navigation extends about 5 miles upstream from the mouth of the St. Marks River and along the Gulf Intracoastal Waterway easterly to its terminus near Carrabelle, Florida.

Both the fresh and salt waters of the Basin are noted for sport fishing. There are several commercial beaches along the Gulf Coast and boating is extensive in the coastal areas. Coastal cities such as Carrabelle, Panacea, St. Marks, St. Theresa, and Wakulla are centers of tourist attraction.

Lake Talquin is the only major reservoir in the Basin. This lake was formed by Jackson Bluff Dam and has a usable capacity of 69,560 acre-feet. The dam is owned and operated by a private utility company for generation of hydroelectric power. Operation of this dam causes wide fluctuations in daily flows in the downstream reaches of the Ochlockonee River. There is also a large number of small lakes, reservoirs, and farm ponds which have little effect upon stream flows.

CLIMATE AND HYDROLOGY

The climate of the area is mild, the mean annual temperature ranging from about 65°F in the north to 67°F in the south. The frost-free growing season varies from 250 days in Georgia to 280 days along the coast. The average annual rainfall varies from about 46 inches in the Georgia portion of the Basin to approximately 56 inches along the coast. The rainfall is fairly uniform throughout most of the year.

The 32-year flow record (1926-58) at the Ochlockonee River near Havana, Florida where the drainage area is 1,020 square miles, shows a 24-hour maximum discharge of 55,900 cfs, a minimum discharge of 17 cfs, and an average discharge of 934 cfs. This station is located above Talquin Lake and, therefore, is not affected by the power dam operations.

The Ochlockonee Basin lies within both the upper and lower Coastal Plain Provinces. The line dividing the two provinces extends roughly in an east-west direction and divides the Basin approximately in half. Although different in name, the geology of the upper and lower Coastal Plain Provinces is generally the same. Both are underlain by the principal limestone aquifer which is one of the most productive aquifers known.

The principal limestone aquifer consists mainly of hydraulically connected limestone beds. Above and below the aquifer are beds of low permeability that confine the water in the limestone. The upper confining bed is the Hawthorne clay formation and the lower bed is the McBean clay formation. The depth of the aquifer in the Basin varies from 100 to 600 feet and it is about 500 feet thick. There are no known cones of depression or areas of recharge of this aquifer in the Basin. Municipal ground water supplies in the Basin are obtained from the principal limestone aquifers.

POPULATION

The population of the Ochlockonee Basin, according to census data provided by the U. S. Study Commission, was 207,800 in 1960. This represents an increase of 25,300 or 13.9 percent over the 182,500 reported by the 1950 Census. The urban population (municipalities

of 2500 or more) increased 56.5 percent during the 1950-60 decade while the rural population decreased 7.5 percent.

There are six communities in the Basin which have populations greater than 2500. These are in Georgia, Cairo, 7,427; Pelham, 4,609; and Thomasville, 18,246; in Florida, Perry, 8,030; Quincy, 8,874; and Tallahassee, 48,174.

RESOURCES

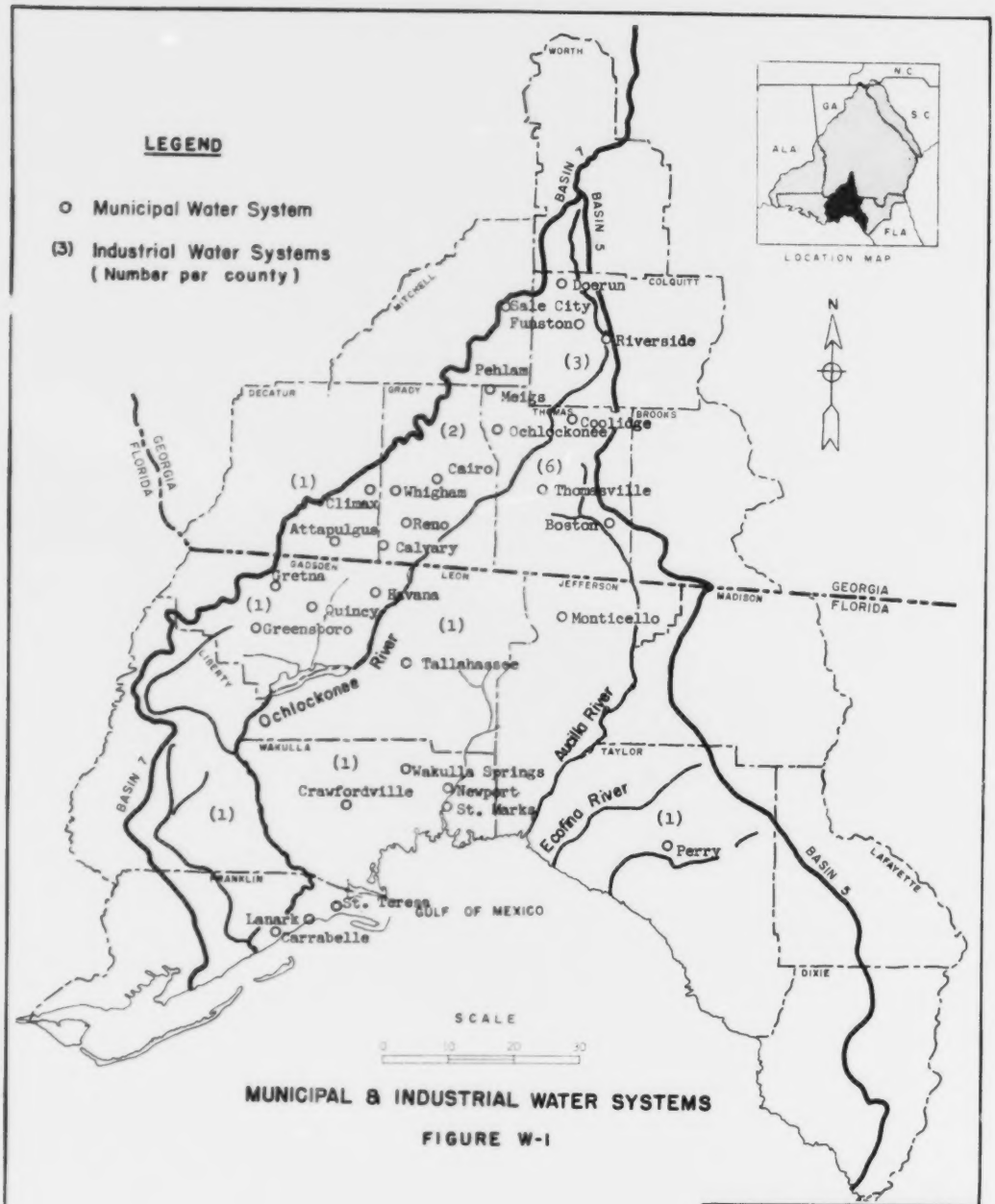
The economy of the Basin is one of combined agriculture and industry with a slightly greater number of persons engaged in farming than in manufacturing. There are significant differences in the nature and extent of economic activities in the Georgia and Florida portions of the Basin. Although the Georgia portion comprises less than 25 percent of the Basin area, this portion has about 60 percent of the Agricultural employment and 45 percent of the manufacturing employment. The land resources are used principally for forestry in Florida and agriculture in Georgia. Leading income crops are forestry products, cotton, tobacco, peanuts, corn, and commercial truck crops.

Food processing and wood products and lumber are the most important industries of the Basin. These two industries account for about 60 percent of the 9,100 persons employed in manufacturing. The remaining employment is distributed among textiles, apparel, pulp and paper, and others.

Commercial navigation extends about 5 miles upstream from the mouth of the St. Marks River and along the Gulf Intracoastal Waterway easterly to its terminus near Carrabelle, Florida.

Both the fresh and salt waters of the Basin are noted for sport fishing. There are several commercial beaches along the Gulf Coast and boating is extensive in the coastal areas. Coastal cities such as Carrabelle, Panacea, St. Marks, St. Theresa, and Wakulla are centers of tourist attraction.

MUNICIPAL, INDUSTRIAL AND DOMESTIC WATER SUPPLIES



MUNICIPAL & INDUSTRIAL WATER SYSTEMS

FIGURE W-1

PUBLIC HEALTH SERVICE
REGION IV
OCHLOCKONEE
BASIN NO. 6
JANUARY 1, 1960

INTRODUCTION

SCOPE OF MEMORANDUM

This memorandum contains data and information concerning the present status of municipal, industrial, and domestic water supply systems whose source of water is in the Ochlockonee Basin. Although an attempt was made to collect data on semi-public water supplies, the amount of information available was not sufficient to warrant inclusion in this memorandum. Estimated future water requirements in the Basin for the years 1975 and 2000 are also presented, as are suggested solutions to present and anticipated future water supply inadequacies. In connection with these suggested solutions, an appraisal of the benefits to be derived and the annual costs of obtaining water are included.

This memorandum contains no data concerning water requirements of steam-electric generating stations located in the Basin.

PROCEDURES AND INVESTIGATIONS

Existing data on water demand and availability were obtained from reports, records, and correspondence of the Florida State Board of Health, the Florida State Chamber of Commerce, the Georgia Department of Public Health, the Georgia State Chamber of Commerce, the Georgia Department of Commerce, the U.S. Department of Agriculture, and other Federal and State agencies. Where data were found to be lacking or out-dated, extensive field investigations were conducted. These field investigations were conducted by the Florida State Board of Health and the Georgia Department of Public Health. The data obtained were submitted to the Public Health Service for inclusion in this memorandum. The field investigations included visits to municipalities, small communities, industries, institutions, and a limited number of domestic water users.

Data were obtained regarding the 51 municipal water supply systems in the Basin and carefully studied to establish both present and future water requirements and water supply needs. Data on industrial water use were obtained from the municipalities furnishing the water, or when an industrially-owned water supply system was involved, from the industry itself. The location of municipal and industrial water supply systems is shown by Figure W-1.

Little information was available concerning the large number of existing domestic water supply systems. Because limited time and funds would not permit a complete inventory of all domestic water systems, a random sample survey of approximately 500 systems throughout the SERB area was made. The data thus obtained were analyzed and certain conclusions were drawn regarding the average number of persons served by each system, the percentages of the various types of

wells and equipment, and the extent of improvements needed. These SERB area averages were applied to the Ochlockonee Basin.

BASIC ASSUMPTIONS

Populations of individual municipalities have been projected to 1975 and 2000 using census data where available or estimated populations for communities not listed in census reports. Projections were made by applying the geometric progression method based on the rate of increase over the period 1930-1960, modified by considerations of changing economic conditions. However, the population projections of urban areas (municipalities of 2500 or more) were adjusted to match projections made by the U.S. Study Commission.

For purposes of this memorandum, future municipal water demands were determined using projected urbanized area populations and estimated per capita water use. The 1975 needs were determined using a water demand of 100 gallons per capita per day (gpcd) in municipalities of under 1,000 persons and 150 gpcd in municipalities of 1,000 or more. The 2000 projections were based on a water demand of 150 gpcd in municipalities of less than 1,000 persons and 200 gpcd in municipalities of 1,000 or more.

The number of domestic water users was estimated for 1960, 1975, and 2000. This number was determined by obtaining the difference between the population within the Basin served by municipal water systems and the total population of the Basin. Future domestic water demand was estimated by using 70 gpcd in 1975 and 100 gpcd for 2000. A figure of 4.5 persons per system was used to determine the number of domestic water supply systems. All future systems were assumed to be pressurized.

Projections of industrial water system demands (for those industries receiving all or a portion of their supply from industrially-owned systems) were determined by assuming that water demands will increase or decrease in direct proportion to projected industrial growth or decline. In addition, several new industries are expected to locate in the Basin.

January 1, 1960 constant dollars were used for the purpose of estimating annual capital costs, annual operation and maintenance costs, and annual replacement costs of existing and needed water supply systems. An interest rate of 4¼ percent was used for determining annual costs for municipal, domestic, and industrial water supply systems.

Water supply system costs have been estimated on the basis of per capita cost data developed by the Public Health Service and adjusted to the January 1, 1960 Engineering News-Record Construction Cost Index for Atlanta, Georgia.

(6/15/62)

SURFACE WATER

A description of the major streams in the Ochlockonee Basin has been included in the INTRODUCTION of these memoranda. Availability of data on quality of surface water in the Basin was limited, according to the report, Water Quality Basic Data-Southeast River Basins, 1961 prepared for the U.S. Study Commission by the Public Health Service. Fifteen chemical quality stations reported analyses results. Six stations were located on streams (2 on the main stem of the Ochlocknee) and 9 at springs.

A study of the available data on the streams indicates that the waters are relatively soft and contain low dissolved solids, with the exception of two stations near the coast in the Fenholloway River sub-basin. The hardness at these two stations was 132 and 152 ppm, whereas the hardness at the other stations ranged from 8 to 39 ppm. The iron concentration of the stream waters ranged from a trace to 1.6 ppm. Four of the six stations reported iron concentrations greater than the 0.3 ppm. The concentration of the other mineral constituents reported appear to be normal for surface waters.

Spring waters in the Basin contain greater concentration of total hardness than the surface waters. The hardness ranges from 3 ppm to 821 ppm with the median value of all stations of 134 ppm. The total dissolved solids ranges from 15 to 1080 ppm with a median value of 167 ppm. An iron concentration of 0.80 ppm was reported at one station.

To supplement existing surface water quality data, a sampling station was established by the Public Health Service on the Ochlocknee River at Thomasville, Georgia. Samples were taken during November 1960, January and February, 1961, and June 1961. Average dissolved oxygen values varied from 51 to 87 percent of saturation with a minimum of 34 percent reported during the fall. Median coliform concentration ranged from 11,250 to 29,000 Most Probable Number (MPN) per 100 ml during the winter and summer and up to 695,000 MPN per 100 ml during the fall. Turbidity ranged from 10 to 65 and color from 37 to 120. Sources of municipal waste entered the river above the water quality station.

Only two municipal water supply systems in the Basin utilize surface water sources at the present time. This is due primarily to the availability of high quality ground water in practically unlimited amounts. A few industries use surface water for processing and cooling purposes.

GROUND WATER

Ground water is plentiful throughout the Basin due to the

highly productive principal limestone aquifer which underlies the area. Many springs and several wells yield as much as 3,000 gallons per minute, and the depth of the aquifer is usually found within 500 feet of the ground surface.

The availability of ground water quality data was good especially in the Florida portion of the Basin. Analyses are available from eleven stations in Florida and four stations in Georgia. Most analyses were of water from the principal limestone aquifer. The total dissolved solids content of these waters ranged from 139 to 1030 ppm, hardness from 88 to 335 ppm, and iron concentration exceeded 0.3 ppm at five stations.

Analyses of water from shallow wells in the overlying rock formation of Franklin and Wakulla Counties varied widely. Total dissolved solids varied from 129 to 2475 ppm, two stations reported chlorides in excess of 250 ppm, and four stations reported iron concentration in excess of 0.3 ppm.

The quality of the ground water in the Ochlockonee Basin is such that treatment for the removal of iron and/or reduction of hardness is required at many locations to meet the chemical quality limits of the Public Health Service "Drinking Water Standards".

MUNICIPAL WATER SUPPLIES

INVENTORY

As shown by Table W-1, there are 51 municipal water systems whose source of water is within the Ochlocknee Basin. These systems serve 124,770 persons in 51 communities and institutions. One of the systems uses surface water as the source of municipal supply, one uses both surface and ground water, and the remainder use water from wells only. The total population of the Ochlockonee Basin in 1960 was 207,800.

PRESENT STATUS OF WATER SUPPLY SYSTEMS

The average water demand of the 51 municipal systems shown in Table W-1 is 12.06 mgd or 97 gallons per capita per day (gpcd). Industries which depend on municipal systems for water supply consume 1.1 mgd or 9 percent of the total municipal system output.

Twenty-nine of the municipal water supply systems are privately owned and 22 are publicly owned. All plants have periodic bacteriological examinations made of the water supplied to the public. Four systems have aeration plants (with chlorination) which are usually provided for iron removal, 13 provide simple chlorination only, one provides complete treatment, and one has softening.

The 32 remaining systems have no treatment, although the supplies have proven bacteriologically satisfactory up to the present time without disinfection. The Thomasville, Georgia system which serves 18,510 persons provides fluoridation.

The only difficult treatment problem reported was at Quincy, Florida, where algae interfere with treatment processes.

WATER SUPPLY SYSTEM REQUIREMENTS FOR 1960

Although 18 municipalities reported that improvements to their present water supply systems were needed, a study of the basic data indicates that all of the water supply systems have source, treatment, storage, or distribution system inadequacies.

The recommended improvements, as shown by Table W-2 in terms of cost, include wells for 14 communities, disinfection for 37, iron removal for 3, softening for 2, storage facilities for 18, high service pumps for 3, and distribution system extensions in 14 municipalities to serve approximately 9600 additional persons.

FUTURE WATER SUPPLY SYSTEM REQUIREMENTS

Table W-3 shows the projected municipal water demands for 1975. It is anticipated that most subdivisions shown in the 1960 inventory will have been incorporated into adjacent cities by 1975. The 34 municipal water systems expected to exist in 1975 will have an estimated total water demand of 25.98 mgd and will serve an estimated 175,640 persons. Water supply system improvements in addition to those listed as being needed in 1960 will be required to adequately serve this population. A study of the basic data indicates that wells will be required in 2 municipalities, disinfection equipment in 2, treatment plant construction (additions to existing facilities) in 2, elevated storage in 9, and expansion of distribution systems to serve an estimated 46,250 persons in 26 communities.

Table W-4 shows the projected municipal water demands for the year 2000. By the year 2000 the 32 municipal water systems obtaining water from sources within the Basin will serve an estimated 300,000 persons. The total water demand is estimated to be 59.81 mgd. A study of the basic data indicates that additional improvements will be required between 1975 and 2000 in one surface source facility, wells will be required in 6, disinfection equipment in 3, new treatment plant construction or addition in 4, elevated storage in 21, and expansion of distribution systems to serve an estimated population addition of 124,100 in 28 communities.

FUTURE WATER SUPPLY PROBLEMS

The ground water resources are expected to be adequate in quanity to meet future demands, however, softening or iron removal will be required at many locations. Development of surface water supplies for municipalities is not expected. Over-development of the aquifers along the coastline could create problems of salt-water intrusion.

ANNUAL COSTS

The annual cost of providing water to municipal users in the Ochlockonee Basin in 1960 is estimated to be $1,164,000. This cost, based on the cost of existing facilities, is broken down as follows:

Annual equivalent capital cost	$558,000
Annual replacement cost	21,000
Annual operation and maintenance cost	585,000
Total annual cost (1960)	$1,164;000

The total capital outlay required to improve the existing municipal water supply facilities in 1960 is estimated to be $2,757,000 as shown by Table W-2. The expenditure of this amount of money will strengthen the existing municipal water systems of the Basin and provide adequate service.

Between 1960 and 1975, additional expenditure will be necessary to improve water supply systems and meet the demands of the increased number of users. The capital cost of providing the additional necessary improvements by 1975 is estimated to be $4,374,000 as shown by Table W-3. This includes $558,000 for improvement of sources and treatment, $1,041,000 for storage facilities, and $2,775,000 for distribution facilities.

The annual cost of providing water to municipal users in 1975 is estimated to be $2,247,300. This includes annual equivalent capital cost of: (1) existing facilities in 1960, (2) facilities recommended to meet 1960 needs, and (3) facilities recommended to meet additional needs between 1960 and 1975. The replacement cost is based on total investment as of 1975, and the operation and maintenance cost is based on the total installed systems as of 1975. A breakdown of this annual cost is given below:

Annual equivalent capital cost	$ 904,300
Annual replacement cost	34,000
Annual operation and maintenance cost	1,309,000
Total annual cost (1975)	$2,247,300

Between 1975 and 2000, municipal growth will make necessary an additional estimated capital expenditure of $12,561,000 to raise the water supply facilities to the necessary capacity. This includes

TABLE W-1

BASIC DATA ON MUNICIPAL WATER SUPPLY SYSTEMS

OCHLOCKONEE BASIN

Municipality	1960 Population	Estimated Population Served	Source	Treatment	Design Capacity mgd	Storage mg	Average Demand mgd	Average Demand gpcd	Percent Used by Industry
FLORIDA									
Carrabelle	1,146	950	well	AtScDc	0.504	0.020	0.072	76	5
Crawfordville (unincorp)	600	90	well	none	0.086	none	0.010	110	
Greensboro	709	550	wells	Dh	0.252	0.060	0.050	91	5
Gretna	647	440	well	none	0.396	0.050	0.020	46	
Havana	2,090	2,490	wells	Dh	0.720	0.120	0.160	64	15
Lanark Village (unincorp)	800	800	wells	Dh	1.728	none	0.064	80	
Monticello	2,490	2,680	wells	none	2.160	0.150	0.300	112	2
Newport (unincorp)	75	75	well	none	0.900	0.075	0.020	265	
Perry	8,030	7,480	wells	AmScDcFar	1.500	0.355	0.626	84	
Quincy	8,874	9,070	Quincy Cr	DcCaMtbSoFraKp	1.500	1.150	0.468	79	35
			wells	Dc	0.792	--	0.250	--	
St. Marks (unincorp)	550	100	well	none	0.100	none	0.006	60	
St. Teresa (unincorp)	250	250	well	none	0.070	none	0.016	64	
Tallahassee	48,174	57,000	wells	Dc	25.200	0.900	6.000	105	1
Victory Garden S/D	--	75	well	none	0.216	none	0.006	80	
Blount Water Supply	--	270	wells	none	0.079	none	0.022	80	
Cascade Park S/D	--	55	well	none	0.432	none	0.005	91	
Cottage Grove	--	140	well	none	0.173	none	0.011	78	
Dale Mabry Airfield	--	500	wells	AtScDc	1.150	0.460	0.040	80	
Lake Jackson Hts. S/D	--	95	well	none	0.108	none	0.004	42	
Lakewood S/D	--	550	wells	none	0.288	none	0.044	80	
Linda Anne Homes S/D	--	65	well	none	0.108	none	0.005	77	
Norwood Estates S/D	--	125	well	none	0.230	none	0.010	80	
Joseph Carrin Supply	--	50	well	none	0.100	none	0.004	80	
Federal Correction Inst.	--	870	wells	Dc	1.100	0.100	0.200	230	
Lake Hall S/D	--	50	wells	none	0.065	none	0.004	80	
Douglas Pichard Supply	--	70	well	none	0.043	none	0.006	86	
Richland S/D	--	210	well	none	0.180	none	0.017	81	
Stiles S/D	--	80	well	none	0.173	none	0.006	75	
Stoutamire Supply	--	130	wells	none	--	none	0.010	77	
Ben Tharpe Supply	--	60	well	none	0.030	none	0.005	83	
Valencia Hts. S/D	--	150	well	none	0.144	none	0.012	80	
Walter Phillips Supply	--	60	well	none	0.036	none	0.005	83	
White Acres S/D	--	160	well	none	0.180	none	0.013	82	
Wakulla Springs Park	--	1,000	Wakulla Spring	none	0.720	0.075	0.050	50	

(6/15/62)

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TABLE W-1 (CONT'D)
BASIC DATA ON MUNICIPAL WATER SUPPLY SYSTEMS
OCHLOCKONEE BASIN

Municipality	1960 Population	Estimated Population Served	Source	Treatment	Design Capacity mgd	Storage mg	Average Demand mgd	Average Demand gpcd	Percent Used by Industry
GEORGIA									
Attapulgus	567	670	wells	none	0.216	0.075	0.030	45	
Industrial Village	--	100	well	none	0.104	0.010	0.005	50	
Boston	1,357	1,020	wells	Dh	1.080	0.045	0.070	69	
Cairo	7,427	7,620	wells	AtDc	3.450	0.800	0.591	78	47
Calvary (unincorp)	75	75	well	none	0.072	0.003	0.003	40	
Climax	329	330	wells	Dc	0.144	0.063	0.015	46	
Coolidge	679	695	well	none	0.050	0.060	0.047	68	
Doerun	1,037	1,070	wells	Dh	0.645	0.133	0.060	56	
Funston	293	290	wells	none	0.230	0.009	0.014	48	
Meigs	1,236	1,250	wells	Dc	0.792	0.195	0.063	50	5
Ochlocknee	502	600	well	Dh	undet	0.070	0.020	33	
Pelham	4,609	4,630	wells	Dc	2.100	0.195	0.680	147	30
Reno	90	90	wells	none	0.140	0.002	0.003	33	
Riverside	329	330	well	Dc	0.664	0.050	0.025	77	
Sale City	275	250	wells	none	0.050	0.065	0.034	136	
Thomasville	18,246	18,510	wells	H-ClsoDcMpSm FsDcVi	2.500	1.300	1.840	100	20
Whigham	463	500	well	Dc	0.288	0.080	0.023	46	
Totals		124,770					12.064	97	

(6/15/62)

TABLE W-2
MUNICIPAL WATER SUPPLY SYSTEMS
ESTIMATED NEEDS AND COSTS* FOR 1960
OCHLOCKONEE BASIN

Municipality	Estimated Costs in $1,000				
	Source	Treatment	Storage	Dist. System	Total
FLORIDA					
Carrabelle	12	100	29	12	153
Crawfordville	6	2	29	25	62
Foley	24	18	31	59	132
Greensboro	--	--	--	13	13
Gretna	12	2	--	12	26
Havana	--	8	--	30	38
Hosford	24	18	35	90	167
Lanark	--	--	27	--	27
Monticello	12	8	--	206	226
Newport	--	2	--	--	2
Perry	--	--	100	33	133
Quincy	--	--	200	--	200
St. Marks	12	4	27	27	70
St. Teresa	12	4	27	--	43
Steinhatchee	24	8	35	36	103
Tallahassee	--	--	272	--	272
Subdivisions	--	36	--	--	36
Fed Correct Inst	6	--	132	--	138
Wakulla Springs	--	8	--	--	8
GEORGIA					
Attapulgus	--	2	--	--	2
Industrial Village	--	2	--	--	2
Boston	--	--	--	21	21
Cairo	12	350	160	--	522
Calvary	--	2	18	--	20
Coolidge	12	8	--	--	20
Funston	--	4	22	--	26
Meigs	--	10	--	--	10
Ochlocknee	18	2	--	--	20
Pelham	12	--	62	--	74
Reno	--	4	18	--	22
Riverside	12	--	--	--	12
Sale City	--	2	--	2	4
Thomasville	--	--	132	--	132
Whigham	12	--	--	9	21
Totals	222	604	1,356	575	2,757

(6/15/62)

TABLE W-3
MUNICIPAL WATER SUPPLY SYSTEMS
ESTIMATED NEEDS AND COSTS* FOR 1975
OCHLOCKONEE BASIN

Municipality	Estimated Population Served	Estimated Water Demand mgd	Estimated Costs in $1,000			
			Source and Treatment	Storage	Dist. System	Total
FLORIDA						
Carrabelle	1,650	0.250	--	35	30	65
Crawfordville	820	0.082	14	--	13	27
Foley	1,500	0.225	--	35	31	66
Greensboro	770	0.077	--	--	--	--
Gretna	800	0.080	--	--	9	9
Havana	2,900	0.435	--	44	25	69
Hosford	950	0.095	--	--	--	--
Lanark	800	0.080	--	--	--	--
Monticello	3,300	0.495	--	--	37	37
Newport	75	0.008	--	--	--	--
Perry	16,400	2.460	212	132	502	846
Quincy	9,600	1.440	--	82	32	114
St. Marks	750	0.075	--	--	12	12
St. Teresa	340	0.034	--	--	5	5
Sopchoppy	600	0.060	32	25	36	93
Steinhatchee	1,000	0.150	--	--	24	24
Tallahassee	81,800	12.300	--	614	1314	1928
Fed Correct Inst	870	0.200	--	--	--	--
Wakulla Springs	1,000	0.150	--	--	--	--

(6/15/62)

TABLE W-3 (CONT'D)
MUNICIPAL WATER SUPPLY SYSTEMS
ESTIMATED NEEDS AND COSTS* FOR 1975
OCHLOCKONEE BASIN

Municipality	Estimated Population Served	Estimated Water Demand mgd	Estimated Costs in $1,000			
			Source and Treatment	Storage	Dist. System	Total
GEORGIA						
Attapulgus	750	0.075	--	--	5	5
Boston	1,550	0.232	--	31	10	41
Cairo	10,100	1.510	--	--	143	143
Climax	130	0.013	--	--	--	--
Coolidge	1,000	0.150	--	--	18	18
Doerun	1,200	0.180	--	--	8	8
Funston	400	0.040	--	--	7	7
Meigs	1,400	0.210	--	--	9	9
Ochlocknee	650	0.065	--	--	3	3
Pelham	6,300	0.945	--	43	100	143
Reno	135	0.014	--	--	3	3
Riverside	550	0.055	--	--	13	13
Sale City	100	0.010	--	--	--	--
Thomasville	24,900	3.730	300	--	383	683
Whigham	550	0.055	--	--	3	3
TOTALS	175,640	25.980	558	1,041	2,775	4,374

* Based on January 1, 1960 constant dollars.
(6/15/62)

TABLE W-4
MUNICIPAL WATER SUPPLY SYSTEMS
ESTIMATED NEEDS AND COSTS* FOR 2000
OCHLOCKONEE BASIN

Municipality	Estimated Population Served	Estimated Water Demand mgd	Estimated Costs in $1,000			
			Source and Treatment	Storage	Dist. System	Total
FLORIDA						
Carrabelle	2,500	0.500	--	45	51	96
Crawfordville	1,500	0.300	14	40	41	95
Foley	2,700	0.540	12	48	72	132
Greensboro	1,025	0.205	--	--	16	16
Gretna	1,000	0.200	--	22	12	34
Havana	4,200	0.840	12	55	77	144
Hosford	1,700	0.340	--	39	12	51
Lanark	800	0.120	--	22	--	22
Monticello	5,300	1.060	--	70	120	190
Newport	75	0.011	--	--	--	--
Perry	31,600	6.320	636	345	912	1,893
Quincy	15,200	3.040	218	132	336	686
St. Marks	1,000	0.200	--	35	15	50
St. Teresa	475	0.071	--	--	8	8
Sopchoppy	1,000	0.200	--	35	24	59
Steinhatchee	1,700	0.340	--	39	42	81
Tallahassee	148,500	29.700	68	1,578	4,000	5,646
Fed Correct Inst	870	0.200	--	--	--	--
Wakulla Springs	1,000	0.200	--	--	--	--

(6/15/62)

TABLE W-4 (CONT'D)
MUNICIPAL WATER SUPPLY SYSTEMS
ESTIMATED NEEDS AND COSTS* FOR 2000
OCHLOCKONEE BASIN

Municipality	Estimated Population Served	Estimated Water Demand mgd	Estimated Costs in $1,000			
			Source and Treatment	Storage	Dist. System	Total
GEORGIA						
Attapulgus	1,000	0.200	--	--	15	15
Boston	2,400	0.480	--	43	51	94
Cairo	16,300	3.260	300	100	372	772
Coolidge	1,300	0.260	14	27	18	59
Doerun	2,000	0.400	--	39	48	87
Funston	600	0.090	--	22	12	34
Meigs	1,750	0.350	--	35	22	57
Ochlocknee	900	0.135	--	--	15	15
Pelham	10,000	2.000	--	100	222	322
Reno	170	0.025	--	--	2	2
Riverside	730	0.110	--	--	11	11
Thomasville	40,000	8.000	600	372	906	1,878
Whigham	750	0.113	--	--	12	12
Totals	300,000	59.810	1,874	3,243	7,444	12,561

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$1,874,000 for source improvement and treatment facilities, $3,243,000 for storage capacity, and $7,444,000 for extension of distribution facilities.

The annual cost of providing water to municipal users in 2000 is estimated to be $4,545,600 assuming that all needs have been met by the year 2000. A breakdown of this annual cost is given below:

Annual equivalent capital cost	$1,514,000
Annual replacement cost	36,600
Annual operation and maintenance cost	2,995,000
Total annual cost (2000)	$4,545,600

BENEFITS

Storage for municipal water supply is frequently one of the purposes served by the development of multi-purpose river basin projects. The cost of developing alternative sources of water supplies most likely to be used in the absence of the project normally provides a measure of the benefits to water supply storage. For most areas of the Basin it may be assumed that water supplies necessary to meet the demands could be obtained from ground water. Where sufficient ground water is not available other alternative sources of surface water have been used in this memorandum.

Because there is no established market value for water, as a commodity sold in a competitive market, monetary benefits from water supplies now used or anticipated to be used in the Basin in the future, from public or private supplies, are indeterminate. In common practice, the value of water supplies for which no market values are clearly established is estimated from the cost of providing supplies by the least costly, most likely means. Therefore, the benefits are assumed to be equal to the cost of obtaining water by the least costly alternative means. In this memorandum, benefits from water supply storage specifically for municipal use included in any multi-purpose project constructed in the Basin would be at least equal to the cost of developing alternative sources.

DOMESTIC WATER SUPPLIES

INVENTORY

The methods for obtaining basic data on domestic water supply systems have been outlined previously in the PROCEDURES AND INVESTIGATIONS section of this memorandum.

The number of persons in the Basin served by existing municipal water supply systems is 124,770. The remainder of the Basin population, or 83,000 persons, is served by domestic water supply systems.

Average per capita water demand is 50 gallons per day which indicates a total existing domestic water demand of 4.15 mgd.

PRESENT STATUS OF WATER SUPPLY SYSTEMS

Based on the analysis of the SERB area wide random-sample survey of domestic supplies, it is estimated that there are 18,400 domestic water supply systems in the Ochlockonee Basin. Of this total, 6390 systems are drilled wells, 8,890 are dug wells, 950 bored wells, 1,180 driven wells, and 990 are springs.

It is estimated that 1,500 systems have an insufficient source of supply and another 3,815 have sources of improper construction. There are 13,155 supplies which have pressure systems and of the remaining 5,245 supplies, 5,035 use hand pumps or buckets. There are 11,200 systems which do not meet accepted health standards and 5,000 systems have water quality problems, the most significant of which are hardness and high iron concentrations.

WATER SUPPLY SYSTEMS REQUIREMENTS FOR 1960

In order to provide a safe, potable supply of water for human consumption, certain minimum improvements will be needed for many of the existing domestic systems. These improvements consist of development of new sources for those systems which have either insufficient yield or sources of improper construction. Systems which presently use hand pumps or buckets should install pressure systems and those systems which do not meet health standards because of improper construction will need seals and covers. Softening or other treatment of those sources which have water quality problems is also needed. In addition, approximately 6,000 persons now served by domestic systems should connect to municipal water supply systems. Costs for providing these needs are listed below.

Total capital outlay to improve existing domestic water supply systems to meet accepted health standards is estimated to be $8,234,200. This includes $3,379,800 for development of new sources, $410,300 for sanitary seals and covers, $2,347,500 for pressure systems, $1,465,500 for treatment facilities, and $631,100 for complete new systems.

FUTURE WATER SYSTEM REQUIREMENTS

In determining future requirements it was assumed that all domestic water supply systems in the future will be pressurized and will meet accepted health standards. By 1975, it is estimated that a total of 18,500 domestic systems serving 83,100 persons will be in existence in the Ochlockonee Basin. This will require construction of 100 complete, new systems (wells, seals and covers, pressurization) and treatment for about 27% of the systems. Total cost of

the new systems is estimated to be $128,600 based on 1960 constant dollars. This cost includes $120,200 for wells, seals and covers, and pressure systems and $8,400 for treatment facilities.

By 2000, an estimated 47,900 persons will be served by a total of 10,600 domestic water supply systems. This represents a decrease in population served by domestic water systems which will result in the abandonment of 7,900 systems between 1975 and 2000.

Average domestic water demand by 1975 will be 5.82 mgd, based on 70 gpcd and in 2000 it will be 4.79 mgd based on 100 gpcd.

ANNUAL COSTS

For the purposes of this memorandum it is assumed that present and future needs of the farm and rural non-farm domestic water systems will be met on an individual basis.

The annual cost of providing domestic water from existing systems is estimated to be $1,276,100. Based on an estimated existing capital investment of $14,732,300, the breakdown of annual cost is given below:

Annual equivalent capital cost	$ 715,400
Annual replacement cost	338,800
Annual operation and maintenance cost	221,900
Total annual cost (1960)	$1,276,100

The annual cost of providing water for domestic water supply systems in 1975 is estimated to be $1,807,900 based on an estimated total investment of $21,762,100. The breakdown of total annual cost for 1975 is given below:

Annual equivalent capital cost	$1,056,800
Annual replacement cost	500,500
Annual operation and maintenance cost	250,600
Total annual cost (1975)	$1,807,900

The annual cost of providing water from the domestic systems expected to exist in 2000 is estimated to be $1,037,600 based on an estimated total investment of $12,476,500. The breakdown of annual cost for the year 2000 is given below:

Annual equivalent capital cost	$ 605,900
Annual replacement cost	287,000
Annual operation and maintenance cost	144,700
Total annual cost (2000)	$1,037,600

INDUSTRIAL WATER SUPPLIES

INVENTORY

Data secured by field surveys of 17 industrially-owned water systems are shown in Table W-5. Only those industries with their own source of water were surveyed, although 3 of the industries shown in Table W-5 supplement their supplies with water from municipal water systems. The 17 industries surveyed use 43.78 mgd from their own sources, and the total amount of water supplied to all industries by municipal systems is 1.1 mgd. Thus, the total industrial water use in the Basin is approximately 44.9 mgd. The one pulp and paper plant in the Basin accounts for 35.94 or 80 percent of the total industrial water demand. Mining accounts for the next greatest industrial water use. Mines use 6.31 mgd or 14 percent of the total water demand.

PRESENT STATUS OF WATER SUPPLY SYSTEMS

Fourteen of the industries surveyed obtain water (not including that from municipal systems) from wells only, and 3 obtain water from both wells and surface sources. The total use from wells is approximately 41.1 mgd and the total use from surface sources is approximately 2.7 mgd. No industry reported that the existing source of water was inadequate to meet demands.

Two of the industries provide disinfection only and one other provides softening for water used for drinking and sanitation. Four industries reported treatment of water used for processing and boiler use. Process and boiler water was softened at 3 of the plants, and one plant used simple chlorination. Three plants reported treating water for cooling. Two plants used softening for cooling water, and one used chlorination only.

No attempt was made to determine total consumptive water use by industry, however it is believed to be relatively small.

FUTURE WATER SUPPLY REQUIREMENTS FOR 1975 AND 2000

Industrial water use from industrially-owned sources by 1975 and 2000 is estimated to be 83.68 mgd and 128.19 mgd respectively. Table W-6 gives the projected water demands and water system needs (in terms of cost) for 1975 and 2000.

Between 1960 and 1975, industrial water supply system needs for existing and new plants will include installation of 14 wells, 4 surface water intakes, 6 chlorinators, one softening plant, and 6 storage facilities.

Industrial development will have expanded between 1975 and

TABLE W-5
BASIC DATA ON INDUSTRIAL WATER SUPPLY SYSTEMS
OCHLOCKONEE BASIN

Location by State and County	Code	Type of Industry	Number of Employees	Drinking and Sanitation			Processing and Boiler			Cooling			Total Plant Demand mgd
				Source	Treatment	Average mgd	Source	Treatment	Average mgd	Source	Treatment	Average mgd	
FLORIDA													
Gadsden	B	pump station	11	well	soften	*				well	soften	*	0.035
Leon	D	wood prod	500	well	none	0.002	well	soften	0.030				0.032
Liberty	G	naval stores	95	wells	none	0.001	wells	none	0.050				0.051
Taylor	F	pulp mill	590	well	chlor	0.500	wells	soften	35.440	recycle	--	*	35.940
Wakulla	C	asphalt refining	55	well	none	0.001	St. Marks River	soften	0.012	St. Marks River	soften	0.012	0.025
GEORGIA													
Colquitt	H	rendering	20	city	--	--	well	none	0.085				0.085
	I	dairy	5	well	none	*	well	none	*	well	none	*	0.006
	K	textile	320	well	chlor	*	well	chlor	*	well	chlor	*	0.138
Decatur	A	mining	300	well	none	*	well & creek	none	*	Creek	none	*	2.020
Grady	C	meat pk	10	well	none	*	well	none	*	well	none	*	0.400
	F	mining	29	well	none	0.005	Creek	none	0.500	Creek	none	0.160	0.665
Thomas	G	mining	21	well	none	0.001	--	--	--	well	none	0.021	0.022
	L	bakery	220	well	none	*	well	none	*	well	none	*	0.012
	M	mining	60	well	none	0.006	wells	none	3.600				3.606
	N	poultry processing	125	well	none	*	well	none	*	well	none	*	0.155
	O	meat pk	500	well	none	*	well	none	*	well	none	*	0.550
	Q	dairy	6	well	none	*	well	none	*	well	none	*	0.041
TOTAL													43.783

* Breakdown of water use not available. See last column for total demand.

(6/15/62)

TABLE W-6
INDUSTRIAL WATER SUPPLY SYSTEMS
ESTIMATED NEEDS AND COSTS* - 1975 AND 2000
OCHLOCKONEE BASIN

Location by State and County	Code	Estimated 1975 Requirements mgd	Estimated 1975 Requirements Costs	Estimated 2000 Requirements mgd	Estimated 2000 Requirements Costs
FLORIDA					
Gadsden	B	0.035	--	0.035	--
Leon	D	0.030	--	0.024	--
	New[1]	0.800	94,000	1.600	12,000
	New[2]	0.035	39,000	0.090	--
	New[3]	0.250	68,000	0.450	--
Liberty	G	0.047	--	0.040	--
Taylor	F	56.000	2,700,000	75.000	2,700,000
Wakulla	C	0.027	--	0.034	10,000
GEORGIA					
Colquitt	H	0.129	--	0.236	--
	I	0.012	--	0.024	--
	K	0.118	--	0.095	--
Decatur	A	2.020	--	2.020	--
Grady	C	0.600	--	1.000	12,000
	F	1.800	6,000	2.700	--
	New[4]	3.000	11,000	5.700	11,000
	New[2]	0.080	47,000	0.190	--
	New[4]	1.000	6,000	1.900	--
Mitchell	New	0.062	--	0.250	--
Thomas	G	0.018	--	0.033	--
	L	9.600	24,000	19.200	36,000
	M	0.234	--	0.415	12,000
	N	0.834	--	1.470	12,000
	O	0.068	--	0.137	12,000
	Q	4.000	12,450	7.600	11,000
	New[4]	0.078	39,000	0.195	--
	New[2]	2.800	106,000	7.750	24,000
	New[1]				
Totals		83.677	3,152,450	128.190	2,852,000

* Based on January 1, 1960 constant dollars.

[1] Chemical

[2] Metals

[3] Food

[4] Sand, clay, or glass

(6/15/62)

2000 to the point that water supply system needs will include 15 new wells, 2 intake enlargements, 5 chlorinators, and additions to 2 softening plants.

FUTURE WATER SUPPLY PROBLEMS

No significant industrial water supply problems, from the standpoint of quantity and quality, are expected in the future. The major portion of water supplied to industry is obtained from industrially-owned systems, and this trend is expected to continue into the future.

ANNUAL COSTS

Existing industrial water supply systems are reported to be adequate for 1960 needs. The annual cost of providing industrial water in 1960 from existing supplies is estimated to be $1,623,400. A breakdown of this cost, based on the cost of existing facilities, is given below:

Annual equivalent capital cost	$ 184,000
Annual replacement cost	5,400
Annual operation and maintenance cost	1,434,000
Total annual cost (1960)	$1,623,400

The annual cost of providing the industrial water required by 1975 is estimated to be $2,798,000. This includes annual equivalent capital costs of existing facilities in 1960, and facilities recommended to meet additional needs between 1960 and 1975. The replacement cost is based on the total investment as of 1975, and the operation and maintenance cost is based on the total installed systems as of 1975. A breakdown of this cost is given below:

Annual equivalent capital cost	$ 337,000
Annual replacement cost	10,000
Annual operation and maintenance cost	2,451,000
Total annual cost (1975)	$2,798,000

The annual cost of providing the industrial water needed by 2000 is estimated to be $4,021,000, assuming that all the needs have been met by the year 2000. A breakdown of this cost is given below:

Annual equivalent capital cost	$ 475,000
Annual replacement cost	14,000
Annual operation and maintenance cost	3,532,000
Total annual cost (2000)	$4,021,000

BENEFITS

Storage for industrial water supply is frequently one of the

purposes served by the development of multi-purpose river basin projects. The cost of developing alternative sources of water supplies most likely to be used in the absence of the project normally provides a measure of the benefits to water supply storage. For most areas of the Basin it may be assumed that water supplies necessary to meet the demands could be obtained from ground water. Where sufficient ground water is not available other alternative sources of surface water have been used in this memorandum.

Because there is no established market value for water, as a commodity sold in a competitive market, monetary benefits from water supplies now used or anticipated to be used in the Basin in the future, from public or private supplies, are indeterminate. In common practice, the value of water supplies for which no market values are clearly established is estimated from the cost of providing supplies by the least costly, most likely means. Therefore, the benefits are assumed to be equal to the cost of obtaining water by the least costly alternative means. In this memorandum, benefits from water supply storage specifically for industrial use included in any multi-purpose project constructed in the Basin would be at least equal to the cost of developing alternative sources.

SUMMARY

1960

The total average water demand of existing (1960) municipal, domestic, and industrial water systems whose source is within the Ochlocknee Basin is estimated to be 60.0 mgd. There are 51 municipal water systems (serving 124,770 persons), an estimated 18,400 domestic water systems (serving 83,000 persons), and 17 industrially-owned water systems. The total annual cost of providing water for all systems is estimated to be $4,063,500.

1975

By 1975, the total average water demand of municipal, domestic, and industrial water systems is estimated to be 115.48 mgd. The 34 municipal water systems will serve 175,640 persons and there will be an estimated 18,500 domestic water systems serving 83,100 persons. The total annual cost of providing water for municipal, domestic, and industrial uses is estimated to be $6,853,200 by 1975.

2000

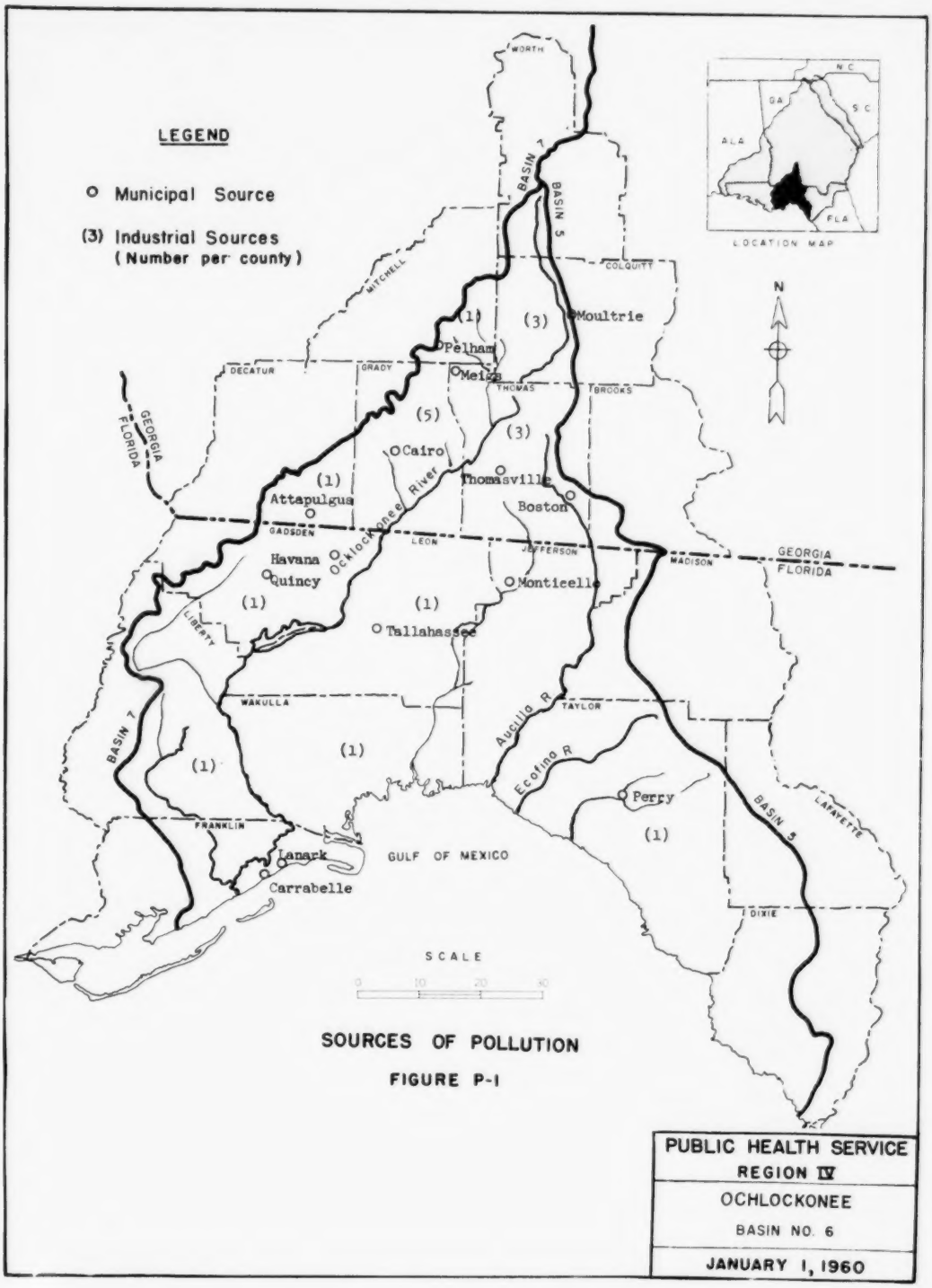
By the year 2000, the total average water demand of all systems in the Basin is estimated to be 192.79 mgd. The 32 municipal systems will serve 300,000 persons, and there will be an estimated 10,600 domestic water systems serving 47,900 persons. The total annual cost

of providing water for municipal, domestic, and industrial water uses is estimated to be $9,604,200 by the year 2000.

Water supply sources in the Ochlockonee Basin are expected to be adequate to meet demands in the year 2000 if they are properly developed. Iron removal or softening will be needed by many municipal and industrial systems. Ground water aquifers will continue to be the major source of water supplies.

POLLUTION ABATEMENT

P-1-a



SOURCES OF POLLUTION

FIGURE P-1

PUBLIC HEALTH SERVICE
REGION IV
OCHLOCKONEE
BASIN NO. 6
JANUARY 1, 1960

INTRODUCTION

SCOPE OF MEMORANDUM

This memorandum contains data and information concerning the present status of municipal and industrial sewage works which discharge to the Ochlockonee Basin.

Projected future pollution abatement requirements for industries and municipalities by the years 1975 and 2000 are presented, as are suggested solutions to present and anticipated future inadequacies. In connection with these solutions, an appraisal of the benefits to be derived from the proposed program and the annual costs of pollution abatement are included.

PROCEDURES AND INVESTIGATIONS

Existing data on pollution abatement in the Basin were obtained from reports, records, and correspondence of the Florida State Board of Health, the Georgia Department of Public Health, the Georgia State Chamber of Commerce, the Georgia Department of Commerce, the U.S. Department of Agriculture and other Federal and State agencies. Where data were found to be lacking or outdated field investigations were conducted by the Georgia Department of Public Health and the Florida State Board of Health. The data obtained were submitted to the Public Health Service for inclusion in this memorandum. These field investigations included visits to municipalities, small communities, industries, and institutions.

Data were obtained regarding 19 municipal (which includes 6 institutions) and 18 industrially owned sewage and waste works in the Basin (Figure P-1). Industries connected to municipal sewer systems were not inventoried. The data were carefully studied to establish both the present and future pollution abatement requirements.

BASIC ASSUMPTIONS

Populations of individual municipalities have been projected to 1975 and 2000 using census data where available or estimated populations for communities not listed in the census reports.

Projections were made by applying the geometric progression method based on the rate of increase over the period 1930-1960, modified by considerations of changing economic conditions. However, the population projections of urban areas (municipalities of 2500 or more) were adjusted to match projections made by the U.S. Study Commission.

Existing industries are expected to increase or decrease their

waste discharges in the future in proportion to the projected industrial growth or decline. In addition, nine new industries are expected to locate in the Basin. These include 2 chemical, 3 metal, 1 food processing and 3 sand, clay and glass plants. For the purpose of this memorandum, it is assumed that municipalities of 800 or more should be sewered now and municipalities of less than 800 should be sewered whenever the present methods of disposal are considered inadequate. It is also assumed that each municipality, regardless of population, now partially sewered should extend its collection system to serve the total population.

In the administration of "Grants for Construction" under Section 6 of Public Law 660 and its amendments, the Public Health Service has established "The substantial removal of settleable solids" as the minimum acceptable treatment for projects in which the Federal Government participates. In general, the Public Health Service considers primary treatment to be the minimum acceptable degree of treatment for municipal sewage and an equivalent treatment the minimum for industrial liquid wastes. The need for additional treatment has been determined on the basis of expected dilution water available during periods of low stream flow and/or downstream water use. With the exception of the Florida portion of the Basin, stabilization ponds have been recommended for most municipalities with less than 1500 persons.

It is assumed that primary treatment plants will effect 35 percent BOD removal and secondary plants will effect 85 percent BOD removal. Tertiary treatment or a greater than 85 percent BOD removal has not been considered for purposes of reducing low flow requirements. At these higher treatment efficiencies, dilution water requirements for water quality control depend on dilution of nutrients and chemicals present in the water rather than dilution of remaining BOD. Plant nutrients and chemicals are reduced very little, if any, in conventional sewage treatment plants and must, therefore, be considered as important pollutants in sewage effluents.

Sewage works costs have been estimated on the basis of per capita cost data developed by the Public Health Service and adjusted on the basis of the January 1, 1960 Engineering News-Record Construction Cost Index for Atlanta, Georgia. Engineering, legal, and financing costs have been added on the basis of United States experience for the period July 1956-June 1959. Sewage system costs include the cost of structures, devices, equipment, and appurtenances intended for the collection and pumping of sewage. Treatment plant costs include the cost of treatment facilities and outfall lines.

Annual equivalent capital costs, annual operation and maintenance costs, and replacement costs of existing and needed pollution abatement facilities were estimated on the basis of January 1, 1960 constant dollars. An interest rate of 4¼ percent was used for de-

termining annual costs for both industries and municipalities.

GENERAL

Water pollution may be defined as the adding to water of any substance, or the changing of water's characteristics in any way which interferes with its use for legitimate purposes. Water polluting substances may be classified according to eight general categories: (1) Sewage and other oxygen demanding wastes, (2) infectious agents, (3) plant nutrients, (4) organic chemical exotics, (5) sediments, (6) radioactive substances, (7) heat, and (8) toxic and other mineral and chemical substances.

The Nation and its communities, as well as business and private operations and individuals, incur losses or damages because of water pollution. Some of these losses or damages are reflected directly in additional costs for construction, operation and maintenance of water treatment facilities. By far the larger share of the total damages is not directly accountable. The impairment to health, the loss or dimunition of fishing and recreational uses, and depreciated property values, caused by polluted waters, have an adverse economic impact which is diffused throughout society. This is paid for through the reduction in utility of the water resources and the restriction on economic growth rather than through dollar payments for corrective devices. Unfortunately, these indirect consequences of pollution are not readily expressed in dollar terms because of their diffusiveness and because they are not recorded by direct, open-market transactions. Nevertheless, such adverse consequences are real and constitute a handicap to the fulfillment of economic and social goals.

Pollution control measures alleviate these adverse conditions and produce economic benefits associated with the improved waters. These benefits are often not apparent to the public, however, because they constitute insurance for future usefulness as well as for immediate purposes, or they may be indirect or intangible. The computation of these benefits faces the same difficulties as the computation of the total damages. That is, the dollar measurement problem has not yet been solved and a yardstick for actions or events not recorded in market transactions is lacking. Many of the benefits from pollution control are in this nonmarket realm, e.g., enhancement of fishing and recreational opportunity, protection of health, scenic improvement, and assurance of the future utility of water resources for various other purposes. The private market prices system, therefore, cannot be relied upon solely or chiefly to provide the measurement. New devices for taking into account the social or public values must be devised.

INVENTORY OF POLLUTION ABATEMENT

SOURCES OF POLLUTION

The surface waters of the Basin are used for the final disposal of liquid wastes, treated and untreated, from 19 municipalities (including 6 institutions), and 18 industries as shown by Tables P-1 and P-2. Municipalities and institutions discharge 10.4 mgd of sewage all of which has undergone treatment of some type and industries discharge 42.1 mgd of which 40.6 mgd has undergone treatment of some type. One industry, a pulp and paper mill, accounts for about 85 percent (35.4 mgd) of the total volume of industrial waste discharged.

A total of 97,460 persons are served by the 19 municipalities and institutions which discharge to the Ochlockonee Basin. The total population equivalent (PE) of the municipal sewage in the Basin is estimated to be 141,160 before treatment and 48,140 of this total is discharged to the Basin's waters after treatment.

The industrial wastes produced in the Basin include textile, mining, food, chemical, and pulp and paper wastes. The food processing industry which is the most numerous industry in the Basin accounts for 8 of the 18 industries inventoried. The strength of the organic wastes from the 10 industries for which data were available is estimated to be 1,012,600 PE based on BOD. However, one pulp and paper mill accounts for over 95 percent (976,000 PE) of the total. There are 6 industries which produce inorganic liquid wastes such as acids, alkalies, sediments, etc. and data for the other 2 industries was undetermined. The total population equivalent of the industrial wastes after treatment is estimated to be 903,960.

The waters of the Basin also receive pollution from natural sources and from the agricultural use of the land. Pollution from natural sources include organic material leached from the decaying matter in the forests and swamps and minerals dissolved from the soil and rocks. The pollution resulting from the agricultural use of the land includes organic and mineral fertilizers, insecticides, herbicides, and pesticides which are washed into the waters during heavy rains or which are inadvertently deposited into the waters during application. Drainage from livestock feed lots, dairy barns, pig pens, manure heaps, and other farm refuse also adds to the pollution load carried by the streams.

EXISTING SEWAGE TREATMENT FACILITIES

As shown by Table P-1, 10 municipalities and institutions provide secondary treatment for sewage collected from 86,800 persons (or 89 percent of the total sewered population discharging sewage to the Basin's waters). Stabilization ponds have been considered as secondary treatment plants for the purpose of this summary.

(6/15/62)

TABLE P-1
BASIC DATA ON SOURCES OF MUNICIPAL POLLUTION
OCHLOCKONEE BASIN

Municipality	1960 Population	Estimated Population Served	Estimated Average Flow mgd	Type of Treatment	Design Capacity PE 1,000s	Design Capacity Flow mgd	Estimated PE (BOD) Untr'd Waste	Estimated PE (BOD) Disch'd Waste	Receiving Stream
FLORIDA									
Carrabelle	1,146	400	0.040	primary	2.50	0.200	400	100	St. George Sound
Havana	2,090	1,700	0.175	secondary	3.00	0.300	1,700	600	ditch-Ochlockonee R
Lanark Village	800	800	0.064	secondary	2.50	0.250	800	160	St. George Sound
Gulf Terraces S/D	--	25	0.002	primary	0.70	0.070	25	15	Gulf of Mexico
Monticello	2,490	1,575	0.080	septic tank	1.28	0.128	1,575	1,500	Wolf Cr and Buggs Cr-Aucilla R
Perry	8,030	4,430	0.620	primary	12.50	1.250	4,430	2,500	Pimple Cr-Rocky R-Fenholloway R
Quincy	8,874	5,000	0.650	secondary	12.00	1.200	5,000	750	Quincy Cr-Little R-Ochlockonee R
Oak Park S/D	--	35	0.004	septic tank	0.13	0.014	35	5	Tanyard Cr-Quincy Cr-Little R-Ochlockonee R
Tallahassee	48,174	45,000	4.100	secondary	60.00	6.000	56,000	2,500	St. Augustine Br-L Henrietta-L Munson
Dale Mabry Airfield	--	500	0.050	secondary	2.50	0.175	500	250	creek-L Henrietta-L Munson
Federal Correct. Inst.	--	870	0.100	secondary	1.20	0.200	870	600	ditch-L Lafayette
GEORGIA									
Attapulgus Industrial Village	100	100	0.010	septic tank	undet	undet	100	90	L Attapulgus Cr-Ochlockonee R
Boston	1,357	300	0.012	septic tank	undet	undet	300	250	br-Aucilla R
Cairo	7,427	5,000	0.075	secondary	20.00	2.000	5,000	2,000	Trib-Tired Cr-Ochlockonee R
Meigs	1,236	200	0.011	septic tank	undet	undet	200	200	Oaky Woods Cr-L Ochlockonee R

(6/15/62)

TABLE P-1 (CONT'D)
BASIC DATA ON SOURCES OF MUNICIPAL POLLUTION
OCHLOCKONEE BASIN

Municipality	1960 Population	Estimated Population Served	Estimated Average Flow mgd	Type of Treatment	Design Capacity PE 1,000s	Design Capacity Flow mgd	Estimated PE (BOD) Untr'd Waste	Estimated PE (BOD) Disch'd Waste	Receiving Stream
GEORGIA - Cont'd									
Moultrie	15,764	11,000	1.500	secondary	7.50	0.750	15,000	7,500	Ochlockonee R
Pelham	4,609	3,600	0.350	primary	5.00	0.630	5,000	4,000	Town Br-L Ochlockonee R
Thomasville	18,246	16,200	2.470	secondary	31.00	2.700	43,500	25,000	Bruces Br-Ochlockonee R
V.A. Domiciliary	650	725	0.125	secondary	5.50	0.550	725	120	br-Wards Cr-Aucilla R
Totals		97,460	10.438				141,160	48,140	

(6/15/62)

TABLE P-2
BASIC DATA ON SOURCES OF INDUSTRIAL POLLUTION
(Excludes industries connected to municipal sewer systems)
OCHLOCKONEE BASIN

Location by State and County	Code	Number of Employees	Type of Industry	Type of Waste	Estimated Average Flow mgd	Treatment Provided	Estimated PE (BOD) Untr'd Waste	Estimated PE (BOD) Disch'd Waste	Discharged To
FLORIDA									
Gadsden	A	40	food	cannery	0.002	none	3,000	3,000	cr-Ochlockonee R
Leon	E	6	laundry	soap-alkaline	0.002	none	200	200	undet
Liberty	G	95	chemical	naval stores	0.050	secondary	6,000	2,100	Stokes Br-Telogia Cr
Taylor	F	590	pulp mill	process & sanitary	35.449	settling	976,000	880,000	Fenholloway R
Wakulla	C	55	asphalt refining	oils & phenols	0.001	settling	undet	undet	swamp-St. Marks R
GEORGIA									
Colquitt	H	20	food	rendering	0.080	none	800	800	br-Ochlockonee R
	I	5	food	dairy	0.004	none	10	10	br-Ochlockonee R
	K	320	textile	cooling water	0.060	none	--	--	br-Ochlockonee R
Decatur	A	300	mining	acid	2.000	settling	--	--	L Attapulgus Cr Ochlock
Grady	B	15	food	meat pk.	0.004	none	960	960	L Tired Cr-Ochlockonee R
	C	10	food	meat pk.	0.400	none	500	500	L Tired Cr-Ochlockonee R
	D	375	food	pickle brine	0.200	none	25,000	16,300	L Tired Cr-Ochlockonee R
	E	288	food	organic	0.030	screens	undet	undet	Parkers Hill Cr-Ochlock
	F	29	mining	silt & clay	0.500	none	--	--	Tired Cr
Mitchell	J	265	textile	cooling water	0.040	none	--	--	br-Little Ochlockonee R
	G	21	mining	cooling water	0.210	none	--	--	br-L Ochlockonee R
	M	60	mining	silt & clay	3.000	settling	--	--	Ochlockonee R
	Q	6	food	dairy	0.035	none	90	90	ditch-Ochlockonee R
Totals					42.067		1,012,560	903,960	

(6/15/62)

There are 27 municipalities and institutions in the Basin which provide primary treatment for the sewage collected from 8,500 persons (or 9 percent of the total sewered population discharging sewage to the Basin's waters).

Septic tanks are provided by 5 municipalities and institutions serving 2,200 persons (or about 2 percent of the total sewered population discharging sewage to the Basin's waters). The septic tanks at Monticello in Florida, and Boston and Meigs in Georgia, are overloaded and consequently ineffective as treatment facilities.

As shown by Table P-2, 6 of the 18 industries listed provide treatment of some degree to their liquid wastes. The remaining 12 industries provide no treatment for their liquid wastes.

One industry provides the equivalent of secondary treatment, 4 provide settling for their industrial liquid wastes. The remaining 13 industries provide either screens or no treatment at all for their wastes.

All other industries in the Basin discharge liquid wastes either to septic tanks with subsurface drain fields or to municipal sewer systems. Industries disposing of liquid wastes by these methods were not inventoried and no data are available.

Soil conservation practices used in many areas of the Basin are very useful in preventing pollution resulting from agricultural use of the land. Good erosion preventative measures, practiced by the highway and railroad maintenance departments assist in the control of sediment coming from roadway embankments. There are no pollution control measures used especially for the purpose of abating pollution from natural sources.

EFFECTS ON STREAMS

Very limited data are available on the effects of municipal and industrial waste discharges on the quality of the surface waters of the Ochlockonee Basin. The data that are available are limited mostly to the chemical quality of the surface waters. Much of these data have been summarized and are presented in the report, Water Quality Basic Data-Southeast River Basin, 1961 prepared for the U.S. Study Commission by the Public Health Service.

Chemical quality data were available at 6 surface stream stations in the Basin only one of which was in Georgia. Based on the data that were available the surface streams of the Basin are relatively soft, with the exception of the coastal area in the Fenholloway sub-basin. The hardness of coastal area waters ranged from 133 to 152 ppm whereas the hardness in the remainder of the Basin ranged from 8 to 39 ppm.

(6/15/62)

During November 1960, January and February 1961 and June 1961, the Public Health Service conducted field studies at one station in the Ochlockonee Basin; the Ochlockonee River at Thomasville, Georgia. The studies showed the river to be polluted probably due to the discharge of municipal wastes and the low stream flows which occurred during the surveys. During the November 1960 study, the dissolved oxygen ranged from 34 to 65 percent of saturation and the coliform concentration from 3,600 to 4,300,000 Most Probable Number (MPN) per 100 ml. Some improvement in water quality was noted during the subsequent two studies probably due to an increase in stream flow.

Observations of several of the surface streams of the Basin were made by the Georgia Department of Public Health and the Florida State Board of Health during the inventory phase of this study. The observations and comments made by each of these agencies is quoted below.

Georgia Department of Public Health:

"1. 12/12/60

Little Attapulgus Creek, 2 miles west of Attapulgus, above clay plants. The stream is approximately 30 feet wide at bridge. The channel is braided as it flows through the swamps with a fair flow in the channels. There was no turbidity at the time observation was made and no visual signs of pollution. The water was clear but had a typical swamp color. Some minnows were observed from the bridge and there were signs of fishing in the area.

2. 11/12/60

Little Attapulgus Creek at bridge on paved road west from town. Stream approximately 48 feet wide at bridge. Water had typical swamp color with no turbidity. Stream had a good flow and a clean white sand bottom. This observation is above the Minerals and Chemicals Corporation of America Plant, but downstream from one of the clay plants. A borrow pit along the west side of the railroad between the point of observation on Little Attapulgus Creek and this observation point was filled with water apparently discharged from the clay plant. There was some turbidity in the water giving it a cloudy appearance but no visual signs of other pollution.

3. 12/12/60

Little Attapulgus Creek Bridge on Georgia State Route #241, approximately 3 miles southwest of Attapulgus. Stream apparently 60 feet wide with a deep pool at the bridge. There was some turbidity observed at this point and an oily film had collected on the surface upstream from a fallen tree which acted as a skimming bath. Fish were observed at

at the bridge and there were signs that this was a favorite fishing point.

4. 12/12/60

Attapulgus Creek, at Bridge, U.S. Highway #27, approximately 3 miles southeast from Attapulgus. Stream approximately 150 feet wide; water had typical swamp color with some limited turbidity, probably attributable to recent rains. There were signs that this spot is popular with fishermen. The stream stage was low with very little flow. No visual signs of pollution were observed.

5. 12/12/60

Aucilla River Highway Bridge, Florida State Route #146, east of Monticello, Florida. A wide cypress swamp at bridge site with no noticeable flow. No signs of pollution observed in area.

6. 12/1/60

Ochlockonee River Highway Bridge, Georgia State Route #202, 8 miles north of Thomasville. Stream width approximately 20 feet with shallow depth flow of less than 1 foot per second. Water clear with no visual signs of pollution.

7. 12/1/60

Ochlockonee River Highway Bridge, U.S. #19, 4 miles north of Thomasville. Stream width approximately 50 feet with a flow of approximately 1 foot per second. At the time of observation the water had a yellowish-gray color with high turbidity. The point of observation is immediately (100 yards) downstream from the Dawes sand mining operation.

8. 12/13/60

Ochlockonee River Highway Bridge, U.S. #84, west of Thomasville. Width of stream approximately 70 feet; water had a yellowish-brown color; the flow was sluggish, approximately ½ foot per second; water was turbid.

9. 12/12/60

Ochlockonee River Bridge on Georgia State Route #93, 8 miles southeast of Cairo. Flood plain approximately ½ mile wide with two bridges. At the time of observation there was flow under the north bridge only. Clean white sand banks were observed due to the low stage of the river. The water had a typical swamp color; the channel was from 60 to 65 feet wide and the flow estimated at 1 foot per second. Well worn paths of fishermen were observed and although the day was cold and windy,

people were observed fishing. This same station was observed on December 15 and some slight turbidity was noted, probably due to recent heavy rains. There were no visual signs of pollution observed at either visit.

10. 12/12/60

Ochlockonee River Bridge, Florida State Route #12, east of Havana, Florida. Wide swampy flood plain channel of the stream at this bridge was approximately 96 feet wide. There was a good flow, approximately 1 foot per second. Eight fishing boats, apparently for rent, were observed chained and locked near the bridge. The water had a typical swamp color and there were no visual signs of pollution.

The following 3 observations were made on December 12 immediately south of Cairo, Georgia, on a dirt crossroad:

11. Little Tired Creek: Approximately 25 feet wide with a flow estimated at 1½ foot per second between pools. The stream flows through a wide swampy flood plain; the water is typical of swampy areas, but some turbidity was observed, apparently the result of recent rains. There were no visual signs of pollution, but a faint odor, possibly indicating the presence of pickling brine, was noted.

12. Parker Mill Creek: Stream at wooden bridge was possibly 10 feet wide with a good flow. There were no visual signs of pollution in the stream but trash and rubbish have been dropped along the sides of the unpaved road near this bridge.

13. Tired Creek Bridge, Georgia State Route #111, 4 miles south of Cairo. Stream at bridge approximately 30 feet wide with a flow estimated at 1 foot per second. There was some turbidity observed; the water had a typical swamp color. The stream has two channels and there are two bridges, but the flow beneath the other bridge was less than 4 feet wide. The flood plain of the creek is approximately a quarter of a mile wide with typical swamp growth and pooling. There were no visual signs of pollution observed at this point."

Florida State Board of Health

"1. The Ochlockonee River is in fairly good condition but it is always slightly turbid while low in color.

2. The Fenholloway River is clear and highly colored above the chemical cellulose plant but it is dark, odorous, and turbid below this industry.

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3. Both the Wakulla and St. Marks Rivers are of spring orgin and have very little color or turbidity except during high water when the Wakulla becomes slightly turbid.

4. The Aucilla River is fairly clear with low turbidity but it is highly colored.

5. The Wacissa River is clear and colorless.

6. The Econfina River is fairly clear and highly colored.

POLLUTION ABATEMENT REQUIREMENTS FOR 1960

SEWERAGE

At the present time, 12 municipalities in the Basin serve only a part of their populations and 4 municipalities with populations of 800 or more have no sewage collection system. The 12 municipalities with existing systems should extend their collection systems to serve an additional 25,000 persons and the 4 municipalities should construct new collection systems to serve 4,100 persons. The total capital outlay required as shown in Table P-3 is estimated to be $1,457,000.

TREATMENT FACILITIES

The degree of treatment required at each municipality has been determined on the basis of dilution water available during periods of low stream flow and/or downstream water use. Dilution water use requirements are discussed more fully in the LOW FLOW AUGMENTATION section of this memorandum.

Existing treatment facilities at 4 municipalities and institutions are adequate for present needs. These are Lanark Village, the Gulf Terraces S/D in Lanark Village and the Federal Correction Institute in Tallahassee, in Florida and the V.A. Domiciliary in Thomasville, Georgia.

The 4 municipalities which need to construct new sewer systems will also need to construct new treatment plants. Two of these municipalities should construct secondary treatment plants, one should construct a stabilization pond and one a primary plant. In addition, Monticello, Florida and the Industrial Village in Attapulgus, Boston, and Meigs, Georgia which presently have septic tanks will need to construct new treatment plants. Three of these need stabilization ponds and one a secondary plant.

There are 5 municipalities which should either make additions or enlargements to their existing treatment plants. Two should add a secondary unit to existing primary treatment plants. The total

capital outlay required for needed new construction and additions to existing sewage treatment plants is estimated to be $4,377,000 as shown in Table P-3.

Industrial liquid waste disposal by 4 of the industries surveyed is adequate at present. However, the remaining 15 industries should provide more satisfactory methods of waste treatment and disposal. Four of these industries could connect to nearby municipal sewer systems. Stabilization ponds should be provided by 5 of the industries and 3 should provide holding lagoons. One should provide neutralization, one settling and one septic tanks.

OTHER NEEDS

A need exists in the Ochlockonee Basin and other areas of the Southeast River Basins to determine the effects of pollution from insecticides, pesticides and herbicides and methods for their controlled application.

As mentioned in the section EFFECTS ON STREAMS, there are very little data available on surface water quality in the Basin. There is a need to collect more information on water quality especially as it is affected by waste discharges and sewer developments. There is a particular need to study waste treatment and disposal in the larger urban areas of the Basin such as Thomasville, Georgia and Tallahassee, Florida. The intermittent nature of many of the receiving streams, the interflow between surface and ground water, which is prevalent in the Lower Coastal Plain Province, coupled with the growth and attendant increases in water use and waste discharges will greatly affect water quality within the Basin. The determination of these and other factors affecting water quality will require additional study.

FUTURE POLLUTION ABATEMENT REQUIREMENTS

PROJECTIONS

There are 24 municipalities and institutions expected to have sewage works by 1975. As shown in Table P-5, the total PE of the sewage will be 281,590 before treatment and the PE after recommended treatment is estimated to be 43,550.

By the year 2000, 28 municipalities and institutions are expected to have sewage works. As shown in Table P-5, the total PE of the sewage will be 472,045 and the estimated PE after recommended treatment will be 72,895.

As shown in Table P-6, industrial wastes discharged by 22 industries will have a total PE before treatment of 1,590,550 and 2,202,900 by 1975 and 2000, respectively. These wastes will have an estimated total PE after recommended treatment of 239,120 and 331,590 by 1975 and 2000, respectively. These figures do not include 15 in-

TABLE P-3
MUNICIPAL POLLUTION ABATEMENT
ESTIMATED NEEDS AND COSTS* FOR 1960
OCHLOCKONEE BASIN

Municipality	Treatment Facilities Des'd for (1,000 PE)	Type Recommended	Estimated Costs in $1,000 Sewerage	Treatment	Total
FLORIDA					
Carrabelle	2.5	primary	37	--	37
Foley	1.0	secondary	49	166	215
Havanna	3.0	secondary	19	--	19
Hosford	1.5	secondary	75	218	293
Monticello	3.0	secondary	46	368	414
Perry	12.5	secondary	180	455	635
Quincy	12.0	secondary	194	--	194
Steinhatchee	0.6	primary	30	74	104
Tallahassee Municipal Airport	60.0	secondary	159	--	159
	0.100	secondary	--	25	25
GEORGIA					
Atlapalgus Industrial Village	0.1	secondary	--	10	10
Boston	1.6	secondary	53	32	85
Cairo	20.0	secondary	121	--	121
Doerun	1.2	secondary	52	27	79
Meigs	1.4	secondary	52	30	82
Moultrie	30.0	secondary	238	1570	1808
Pelham	6.0	secondary	50	252	302
Thomasville	46.0	secondary	102	1150	1252
Totals			1457	4377	5834

*Based on January 1960 constant dollars.

(6/15/62)

TABLE P-4
INDUSTRIAL POLLUTION ABATEMENT
ESTIMATED NEEDS AND COSTS* FOR 1960
OCHLOCKONEE BASIN

Location by State and County	Code	Type of Waste	Treatment Recommended	Est. Cost of Treatment $1,000
FLORIDA				
Gadsden	A	cannery	stab pond	26
Leon	E	soap-alkaline	city sewers	--
Taylor	F	pulp process	stab pond	675
GEORGIA				
Colquitt	H	rendering	stab pond	10
	I	dairy	septic tank	2
	K	cooling water	holding lagoon	5
Decatur	A	acid	neutralization	25
Grady	B	meat pk	city sewers	--
	C	meat pk	city sewers	--
	D	pickle brine	stab pond	100
	E	organic	city sewers	--
	F	silt & clay	settling	15
Mitchell	J	cooling water	holding lagoon	5
Thomas	G	cooling water	holding lagoon	5
	Q	dairy	stab pond	10
Totals				878

*Based on January 1960 constant dollars.

(6/15/62)

TABLE P-5
SOURCES OF MUNICIPAL SEWAGE - 1975 AND 2000
OCHLOCKONEE BASIN

Municipality	1975 Treatment Recommended	1975 PE Untreated Waste	1975 PE Discharged Waste	2000 Treatment Recommended	2000 PE Untreated Waste	2000 PE Discharged Waste
FLORIDA						
Carrabelle	primary	1650	1070	primary	2500	1620
Crawfordville	secondary	820	120	secondary	1500	225
Foley	secondary	1500	225	secondary	2700	400
Greensboro	--	--	--	secondary	1025	155
Gretna	secondary	800	120	secondary	1000	150
Havana	secondary	2900	435	secondary	4200	630
Hosford	secondary	950	140	secondary	1700	255
Lanark	secondary	800	120	secondary	800	120
Monticello	secondary	3300	495	secondary	5300	800
Perry	secondary	20500	3075	secondary	39500	5930
Quincy	secondary	9800	1470	secondary	19000	2850
St. Marks	--	--	--	secondary	1000	150
Steinhatchee	primary	1000	650	primary	1700	1100
Tallahassee	secondary	122700	18400	secondary	222700	33400
Municipal Airport	secondary	100	15	secondary	100	15
Dale Mabry Airfield	secondary	500	75	secondary	500	75
Federal Correction Institution	secondary	870	130	secondary	870	130
Sopchoppy	--	--	--	secondary	1000	150

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TABLE P-5 (CONT'D)
SOURCES OF MUNICIPAL SEWAGE - 1975 AND 2000
OCHLOCKONEE BASIN

Municipality	1975 Treatment Recommended	1975 PE Untreated Waste	1975 PE Discharged Waste	2000 Treatment Recommended	2000 PE Untreated Waste	2000 PE Discharged Waste
GEORGIA						
Attapulgus	secondary	850	130	secondary	1100	165
Boston	secondary	1550	230	secondary	2400	360
Cairo	secondary	15000	2250	secondary	24100	3600
Coolidge	secondary	1000	150	secondary	1300	195
Doerun	secondary	1200	180	secondary	2000	300
Meigs	secondary	1400	210	secondary	1750	260
Moultrie	secondary	26300	3950	secondary	41600	6250
Ochlockonee	--	--	--	secondary	900	135
Pelham	secondary	7700	1150	secondary	12500	1875
Thomasville	secondary	58400	8760	secondary	77300	11600
Totals		281,590	43,550		472,045	72,895

(6/15/62)

TABLE P-6
SOURCES OF INDUSTRIAL WASTE - 1975 AND 2000
(Excludes industries connected to municipal sewer systems)
OCHLOCKONEE BASIN

Location by State and County	Code	Treatment Recommended	1975 Vol. of Waste mgd	1975 PE Untreated Waste	1975 PE Discharged Waste	2000 Vol. of Waste mgd	2000 PE Untreated Waste	2000 PE Discharged Waste
FLORIDA								
Gadsden	A[1]	stab pond	0.003	4,500	675	0.006	8,200	1,230
Leon	New[2]	chem precip	0.800	--	--	1.600	--	--
	New[2]	chem precip	0.035	--	--	0.090	--	--
	New[3]	stab pond	0.250	11,500	1,700	0.450	41,500	6,200
Liberty	G	secondary	0.047	5,700	850	0.039	4,700	700
Taylor	F	stab pond	55.600	1,530,000	229,500	75.000	2,080,000	312,000
Wakulla	C	settling	0.001	undet	undet	0.002	undet	undet
GEORGIA								
Colquitt	H	stab pond	0.120	1,200	780	0.220	2,200	1,430
	K	holding lagoon	0.050	--	--	0.040	--	--
Decatur	A	neutralization	2.000	--	--	2.000	--	--
Grady	D	stab pond	0.300	37,500	5,600	0.530	66,000	10,000
	F	settling	1.000	--	--	2.000	--	--
	New[4]	settling	3.000	--	--	5.700	--	--
	New[2]	chem precip	0.080	--	--	0.190	--	--
Mitchell	New[4]	settling	1.000	--	--	1.900	--	--
	J	holding lagoon	0.040	--	--	0.040	--	--
Thomas	G	holding lagoon	0.600	--	--	1.500	--	--
	M	settling	3.000	--	--	5.000	--	--
	Q	stab pond	0.058	150	15	0.116	300	30
	New[4]	settling	4.000	--	--	7.600	--	--
	New[2]	chem precip	0.078	--	--	0.195	--	--
	New[1]	chem precip	2.800	undet	undet	7.750	undet	undet
Totals			74.862	1,590,550	239,120	111.968	2,202,900	331,590

[1]Chemical
[2]Metals
[3]Food
[4]Sand, clay, or glass

(6/15/62)

TABLE P-7
MUNICIPAL POLLUTION ABATEMENT
ESTIMATED COSTS* - 1975 AND 2000
OCHLOCKONEE BASIN

Municipality	Estimated Costs in $1,000					
	1975			2000		
	Sewerage	Treatment	Total	Sewerage	Treatment	Total
FLORIDA						
Carrabelle	25	--	25	43	--	43
Crawfordville	41	140	181	34	78	112
Foley	26	52	78	60	185	245
Greensboro	--	--	--	51	166	217
Gretna	40	166	206	10	--	10
Havana	40	--	40	65	100	165
Hosford	--	--	--	10	21	31
Monticello	40	--	40	100	297	397
Perry	419	732	1151	760	1382	2142
Quincy	36	--	36	280	665	945
St. Marks	--	--	--	50	166	216
Steinhatchee	20	30	50	35	43	78
Tallahassee	1681	3220	4901	3335	4710	8045
Sopchoppy	--	--	--	50	166	216
GEORGIA						
Attapulgus	38	18	56	13	12	25
Boston	10	--	10	43	20	63
Cairo	134	--	134	310	245	555
Coolidge	50	28	78	15	--	15
Doerun	8	--	8	40	20	60
Meigs	8	--	8	17	12	29
Ochlockonee	--	--	--	45	22	67
Moultrie	262	--	262	500	955	1455
Pelham	84	112	196	185	545	730
Thomasville	333	955	1288	755	1440	2195
Totals	3295	5453	8748	6806	11,250	18,056

*Based on January 1960 constant dollars.

(6/15/62)

TABLE P-8
INDUSTRIAL POLLUTION ABATEMENT
ESTIMATED COSTS* - 1975 AND 2000
OCHLOCKONEE BASIN

Location by State and County	Code	Estimated Costs in $1,000 1975	2000
FLORIDA			
Gadsden	A	8	15
Leon	New[1]	68	27
	New[1]	10	12
	New[1]	63	78
Taylor	F	525	500
Wakulla	C	--	5
GEORGIA			
Colquitt	H	4	7
Grady	D	34	61
	F	15	15
	New[4]	50	52
	New[2]	21	6
Mitchell	New	20	17
Thomas	M[4]	--	20
	New[2]	67	46
	New[1]	10	17
		122	186
Totals		1,017	1,064

[1]Chemical
[2]Metals
[3]Food
[4]Sand, clay, or glass

*Based on January 1960 constant dollars.

(6/15/62)

dustries for which waste discharges are either undetermined or of an inorganic nature. It is assumed that all other industries in the Basin will discharge wastes to subsurface systems, evaporation ponds or to municipal sewerage systems.

SEWERAGE

Assuming that sewerage requirements for 1960 will have been met, additional sewerage construction will be required in 19 municipalities by 1975. These 19 municipalities will require extension of the sewage collection systems required for 1960 to serve an additional 65,900 persons. As shown in Table P-7, the total capital outlay required for extension of sewerage systems is estimated to be $3,295,000 to meet 1975 needs.

By the year 2000, there will be a need for sewerage construction in 24 municipalities. These municipalities will require extension of the sewage collection systems recommended in 1960 and 1975 to serve an additional 136,120 persons. As shown in Table P-7, the total outlay required for extension of the sewage collection systems required to meet the needs by the year 2000 is estimated to be $6,806,000.

TREATMENT FACILITIES

The degree of treatment required at each municipality, institution, and industry has been determined on the basis of dilution water available during periods of low stream flow and/or downstream water use. In the upstream areas where low flows are not sufficient to protect water quality after secondary treatment, low flow augmentation is recommended. However, primary treatment only has been recommended for wastes discharged to tidewater. These areas are discussed more fully in the LOW FLOW AUGMENTATION section of this memorandum.

The existing sewage treatment facilities or those recommended for 1960 will be adequate to meet the 1975 needs in 14 municipalities and institutions. Seven other municipalities, however, will need to enlarge either their existing treatment facilities or those recommended for 1960 to meet 1975 needs. Three municipalities will need to construct new treatment plants, two secondary and one stabilization pond. Of the 7 plant enlargements recommended, 1 is for a primary plant, 5 for secondary plants and 1 for stabilization ponds. The total capital outlay required for municipal sewage treatment plant construction by 1975 is estimated to be $5,453,000 as shown in Table P-7.

Existing treatment facilities or those recommended for 1960 will be adequate to meet 1975 needs for 9 industries. However,

5 industries will need additional waste treatment facilities by 1975. In addition, 9 new industries projected for the Basin will need to construct a new treatment plant by 1975. The total capital outlay required for this construction is estimated to be $1,017,000 as shown in Table P-8.

Sewage treatment facilities recommended for 17 municipalities for 1975 will need to be enlarged to meet 2000 needs. In addition, 4 municipalities will need to construct new plants to meet 2000 needs. The total capital outlay required for municipal sewage treatment facilities needed by 2000 is estimated to be $11,250,000 as shown in Table P-7.

The waste treatment facilities recommended for 16 industries for 1975 will need to be expanded to meet 2000 needs. The total capital outlay required for this expansion is estimated to be $1,064,000 as shown in Table P-8.

LOW FLOW AUGMENTATION

GENERAL

A minimum standard of water quality for fish and aquatic life is a dissolved oxygen content of not less than 4 ppm. In determining the volume of stream flow and storage required to maintain this standard, the following assumptions were used:

1. Summer water temperatures.
2. Minimum flows are 7-day low flows occurring once in 10 years.
3. Physical characteristics and reaeration constant of streams vary as to location, size, etc. of stream.

Minimum stream flows required at locations in the Basin where liquid wastes are discharged were calculated on the basis of the estimated PE for the years 1960, 1975, and 2000. At least primary treatment was assumed for all locations, and if the required dilution flow exceeded the actual low flow, secondary treatment was recommended. The minimum flows are shown in Table P-9. Locations requiring minimum flows of less than 1.0 cfs by the year 2000 are not included in the Table.

AREAS WHERE AUGMENTATION IS NOT NEEDED

There will be sufficient volumes of water available for adequate dilution (after recommended treatment) and no storage will be needed to maintain stream quality below the point of discharge from

TABLE P-9
MINIMUM FLOW REQUIREMENTS
OCHLOCKONEE BASIN

General Location	Receiving Stream	Water Required (cfs) 1960	1975	2000
FLORIDA				
Carrabelle[1,2]	St. George Sound	16.6	23.8	36.0
Foley	Fenholloway R	293.1	459.5	624.8
Perry	br-Rocky R-Fenholloway R	2.4	6.2	18.9
Total for	Area	295.5	465.7	643.7
Havana	ditch-Ochlockonee	1.5	2.2	3.7
Monticello	Wolf Cr and Buggs Cr-Aucilla R	0.8	1.0	1.6
Quincy	Quincy Cr-Little R-Ochlockonee R	2.7	2.9	5.7
St. Marks[2]	St. Marks R	--	--	3.8
Steinhatchee[1,2]	Steinhatchee R	8.6	14.4	24.5
Tallahassee	Lake Munsen	18.5	36.8	80.4
Telogia (Ind.)	Stokes Br-Telogia R	1.8	1.7	1.4
GEORGIA				
Cairo	Tired Cr-Ochlockonee R	10.1	15.8	27.0
Moultrie	Ochlockonee R	6.2	8.3	13.1
Pelham	br-L Ochlockonee R	1.8	2.3	3.8
Thomasville	Bruces Br-Ochlockonee R	13.7	17.6	23.3

[1]primary treatment only
[2]discharge to tidewater

(6/15/62)

Telogia, Florida.

AREAS WHERE AUGMENTATION IS NEEDED

At Havana and Quincy, Florida, the streams recieving wastes travel a short distance (1 to 5 miles) before reaching a larger stream with adequate flow. This results in polluted stream conditions for short distances during periods of low flow. Storage for augmentation of low flow or higher degree of treatment to maintain desirable water quality in the short distances involved is not considered the most economical solution to their pollution problems. Studies of alternate solutions, such as waste diversion, will be needed in these areas.

Waste discharges to other areas in the Basin will present greater problems, however, and are discussed below and summarized in Table P-10:

Tidewater Areas

Wastes from Carrabelle, St. Marks, and Steinhatchee, Florida are discharged to tidewaters. Primary treatment has been recommended as a minimum requirement except for those areas with existing secondary treatment facilities. Augmentation is seldom the solution to tidewater pollution. Other measures such as better dispersion of wastes by properly designed outfalls, controlled discharge to take full advantage of tidal movements, etc., are generally better solutions to tidewater pollution problems. Each area will require a detailed study to determine pollution abatement requirements.

Foley-Perry, Florida

Wastes from this area will be discharged after secondary treatment to the Fennholloway River at a point where there is insufficient drainage area to provide adequate dilution water or storage for augmentation during low flow. As a result, the Fenholloway River will be polluted from the point of wastes discharge to the Gulf of Mexico.

Monticello, Florida

Wastes from Monticello are discharged to several small creeks which flow approximately 10 miles to the Aucilla River. There is ample flow (1.8 cfs) in the Aucilla River at the point where these creeks enter the river, but the small creeks will be polluted for their entire distances during periods of low flow.

(6/15/62)

Tallahassee, Florida

The wastes from the Tallahassee area are presently discharged into Lake Munsen which has no outlet. These wastes would require, after secondary treatment, 18.5 cfs, 36.8 cfs and 80.4 cfs in 1960, 1975 and 2000 respectively for adequate dilution if discharged into a flowing stream such as the Ochlockonee River.

As stated in the discussion concerning Moultrie, Georgia, it appears that a reservoir of the size recommended would provide sufficient low flow augmentation in the Ochlockonee River for the Tallahassee wastes. If this proved feasible, it would require diversion of the Tallahassee wastes to the Ochlockonee River. However, it should be noted, that the nearest point for discharge of the Tallahassee wastes on the Ochlockonee River is only a few miles above Lake Talquin and the discharge of wastes may adversely affect recreational and other uses of this lake. Final solution of the Tallahassee waste disposal will require additional study.

Cairo, Georgia

Wastes from Cairo are discharged to both Tired Creek and Little Tired Creek above their point of confluence. The drainage areas at the points of discharge are insufficient to provide adequate dilution water during periods of low flow. Storage for augmentation will be required on both Tired Creek and Little Tired Creek to avoid serious pollution of these creeks and the Ochlockonee River for many miles during periods of low flow. The drainage area of Little Tired Creek above the point of waste discharge is insufficient to provide adequate storage for low flow augmentation. However, construction of a reservoir on Little Tired Creek to provide maximum storage together with construction of another reservoir on Tired Creek would provide sufficient low flow augmentation in Tired Creek below the confluence and in the Ochlockonee River for all Cairo wastes.

The maximum capacity of a reservoir on Little Tired Creek is 3,200 acre-feet which would provide a minimum flow of 7.5 cfs. The capacity of the reservoir required on Tired Creek above the point of waste discharge would be 600 acre-feet, 2,400 acre-feet and 8,100 acre-feet in 1960, 1975, and 2000 respectively.

Moultrie, Georgia

Wastes from Moultrie are discharged to both the Ochlockonee River and Okapilko Creek which is in the Suwannee Basin. As suggested in the POLLUTION ABATEMENT TECHNICAL MEMORANDUM for the SUWANNEE BASIN all wastes now discharged to Okapilko Creek should be discharged to the Ochlockonee River since the drainage area of Okapilko Creek is insufficient to provide adequate dilution water

or storage for augmentation. Thus the total stream flow required for all of the wastes from Moultrie is 15.6 cfs, 24.7 cfs and 53.8 cfs in 1960, 1975 and 2000 respectively. Storage will be required to provide adequate dilution water in the Ochlockonee River. The capacities required are 4,500 acre-feet, 9,200 acre-feet and 23,000 acre-feet in 1960, 1975 and 2000, respectively.

It appears that a reservoir on the Ochlockonee River above Moultrie of the capacity recommended, would provide sufficient low flow augmentation for both Thomasville, Georgia and Tallahassee, Florida. This of course assumes that the wastes from Moultrie would be stabilized before reaching these downstream areas and that there would be no major consumptive use of the river below Moultrie.

Pelham, Georgia

Wastes from Pelham require stream flows of 1.8 cfs, 2.3 cfs and 3.8 cfs in 1960, 1975 and 2000, respectively (after secondary treatment) to prevent damage to the stream during periods of low flow. Pelham is located on the watershed divide and discharges its waste into a watercourse that has little if any low flow. There is insufficient watershed area above the point of waste discharge to provide storage for low flow augmentation. The receiving watercourse will be seriously polluted during low flow periods for 10 to 20 miles below the point of discharge. By the time the wastes reach the Ochlockonee River they will have had time to become sufficiently stabilized by natural processes.

Thomasville, Georgia

The wastes from Thomasville are discharged to a small stream which is a tributary of the Ochlockonee River. These wastes will require, after secondary treatment, a river flow of 13.6 cfs in 1960, 17.6 cfs by 1975, and 23.3 cfs by 2000. The receiving stream does not have sufficient drainage area to provide this flow nor to provide storage for low flow augmentation.

As mentioned in the discussion concerning Moultrie, Georgia, it appears that a reservoir of the size recommended would provide sufficient low flow augmentation in the Ochlockonee River for the Thomasville wastes.

Summary of Augmentation Needs

The areas in the Ochlockonee Basin where storage for low flow augmentation is needed are shown below:

TABLE P-10
RESERVOIR STORAGE NEEDS
OCHLOCKONEE BASIN

Location	Storage Acre-Feet 1960	1975	2000
Perry-Foley, Florida	insufficient drainage area		
Havana, Florida	not economically feasible		
Monticello, Florida	insufficient drainage area		
Quincy, Florida	not economically feasible		
Tallahassee, Florida	see text		
Cairo, Georgia	1. 3,200	3,200	3,200
	2. 600	2,400	8,100
Moultrie, Georgia	4,500	9,200	23,000
Pelham, Georgia	insufficient drainage area		
Thomasville, Georgia	see text		

1. Little Tired Creek
2. Tired Creek

ANNUAL COSTS AND BENEFITS

FINANCING

Municipalities can finance sewage works construction by general obligation bonds, revenue bonds, special assessments, or some combination of these methods. The Georgia law permits the issuance of general obligation bonds to be repaid within 30 years, up to a maximum amount of 7 percent of the evaluation of taxable property within the political sub-division. The law permits an increase of this bonded indebtedness of 3 percent of the evaluation of the taxable property provided the increased indebtedness shall be repaid within a five-year period and is approved by the General Assembly.

The Florida law permits issuance of general obligation bonds up to a maximum amount of 10 percent of the evaluation of taxable property within the political sub-division. Individual exceptions to this law have been made by the legislature.

Georgia law authorizes the State to make grants to any county or municipality if funds are available to assist in pollution abatement projects that qualify for Federal aid under Public Law 660. The State grants are limited to 30 percent of that portion of the construction costs which qualify under the Federal aid program or $250,000 whichever is smaller. To date, however, no grants have been made by the State.

Financial aid is available to municipalities in the form of Federal grant assistance under Public Law 660 as amended. The Federal Government will pay up to 30 percent of the estimated reasonable cost of construction of municipal sewage treatment works or $600,000, whichever is smaller. Eligible for assistance are construction of new treatment works, improvements to existing treatment facilities, intercepting sewers, outfall sewers, pumping, and such preliminary planning necessary for construction. To date, Monticello and Perry, Florida have participated in the Federal aid program constructing both interceptor sewers and/or sewage treatment plants and appurtenant works. Applications have been received and approved and Federal grant offers have been made to Moultrie and Thomasville, Georgia. The project at Moultrie is presently under construction.

Industries will undoubtedly finance their pollution abatement facilities with private capital by the most economical methods available to them at the time of construction.

ANNUAL COSTS FOR 1960

The annual cost of pollution abatement by municipalities and

industries in the Basin in 1960 is estimated to be $1,065,900. This includes the annual equivalent capital cost of existing facilities in 1960, annual replacement, and operation and maintenance cost of existing facilities. A breakdown of the total annual cost is shown below:

	Municipal	Industrial
Annual equivalent capital cost	$ 761,600	$ 32,500
Annual replacement cost	0	0
Annual operation and maintenance cost	251,700	20,100
Total annual cost (1960)	$1,013,300	$ 52,600

The total capital outlay required to improve existing pollution abatement facilities to meet the 1960 needs is estimated to be $5,834,000 for 18 municipalities and institutions and $878,000 for 11 industries. These costs are shown in Tables P-3 and P-4.

ANNUAL COSTS BY 1975

The total capital outlay required for additional pollution abatement facilities needed by 1975 after 1960 needs have been met, is estimated to be $8,748,000 for 19 municipalities and $1,017,000 for 14 industries. These costs are shown in Tables P-7 and P-8.

The total annual cost of pollution abatement by municipalities and industries in 1975 is estimated to be $2,233,700. This includes the annual equivalent capital cost of (1) existing facilities in 1960 (2) facilities recommended to meet 1960 needs, and (3) facilities recommended to meet 1975 needs. The replacement cost is based on the total investment by 1975 and the operation and maintenance cost is based on existing and recommended facilities as of 1975. A breakdown of total annual cost is shown below:

	Municipal	Industrial
Annual equivalent capital cost	$1,469,700	$124,600
Annual replacement cost	0	8,400
Annual operation and maintenance cost	524,400	106,600
Total annual cost (1975)	$1,994,100	$239,600

ANNUAL COSTS BY 2000

The total capital outlay required for additional pollution abatement facilities needed between 1975 and 2000 is estimated to be $18,056,000 for 24 municipalities and $1,064,000 for 16 industries. These costs are shown in Tables P-7 and P-8.

The total annual cost of pollution abatement by municipalities

and industries in 2000 is estimated to be $2,515,700. This includes the equivalent capital cost, the replacement cost, and the operation and maintenance cost of existing facilities and all recommended improvements for 1960, 1975, and 2000. A breakdown of total annual cost is shown below:

	Municipal	Industrial
Annual equivalent capital cost	$2,346,500	$176,200
Annual replacement cost	0	16,600
Annual operation and maintenance cost	826,800	149,600
Total annual cost (2000)	$2,173,300	$342,400

BENEFITS

It is recognized that pollution control results in benefits to public health and to those economic activities associated with the use of water of improved quality. However, because there is no established market value for water, as a commodity sold in a competitive market, monetary benefits from improvement in quality of water now used or anticipated to be used in the future, from public or private sources, in the Basin are indeterminate. While pollution abatement does enhance fishing and recreational opportunities, protect health, preserve and improve property and aesthetic values, and assure future utility of water resources, these values are confined largely to the intangible or social realm.

Ordinarily for those functions for which no market values are clearly established their values may in some cases be derived or estimated indirectly from prices established in the market for similar or analagous effects or may be derived from the most economical cost of producing similar effects by an alternative means. In the case of pollution abatement, however, there are no established prices for similar effects since no analagous effect exists. Neither are there alternative means of providing similar effects since, in most cases, the most likely, least cost means of attaining the desired effects is used. Therefore, lacking adequate methodology for assessing social values, benefits from pollution abatement must, for the time being, be considered as intangible. In the absence of established or synthetic market values, since the benefits from pollution abatement are real although intangible, it is considered that benefits accruing from pollution control by conventional treatment processes are at least equal to the cost of providing the facilities.

Since knowledge of society's future needs is less complete and accurate than information of present requirements, there could well be a tendency to adopt a water quality standard that is at times too high. Such has not been the case in the development of costs in this memorandum, however, because only minimum requirements or needs have been expanded into the future.

(6/15/62)

SUMMARY

1960

At the present time there are 19 municipalities (which include 6 institutions) and 18 industries which discharge wates, treated and untreated, into the surface waters of the Ochlockonee Basin.

The total valume of municipal and industrial wastes discharged to the waters of the Basin is estimated to be 52.5 mgd and the total PE 1,154,200 untreated and 952,100 after treatment.

The existing (1960) total annual cost of pollution abatement by municipalities and industries in the Basin is estimated to be $1,065,900.

1975

By 1975, 24 municipalities and institutions and 22 industries are expected to discharge wastes to the surface waters of the Ochlockonee Basin. The total PE of these wastes is estimated to be 1,872,100 before treatment and 282,700 after recommended treatment.

Reservoir storage for low flow augmentation will be needed in 2 areas in 1975. In 3 areas, receiving streams will not have sufficient drainage area to allow storage for low flow augmentation and thus polluted water conditions will exist during natural low flow periods. In 2 areas, the size and length of the receiving streams is such that low flow augmentation during periods of low flow would not be economically feasible and thus severely polluted conditions are expected to exist for short distances downstream.

The total annual cost of pollution abatement by municipalities and industries by 1975 is estimated to be $2,233,700. This total includes the cost of existing facilities and those needed to meet existing (1960) and projected 1975 needs.

2000

By 2000, 28 municipalities and institutions and 22 industries are expected to discharge wastes to the surface waters of the Ochlockonee Basin. The total PE of these wastes is estimated to be 2,674,900 before treatment and 404,500 after recommended treatment.

Continued reservoir storage will be needed in 2 areas in the Basins by 2000. As in 1975, 3 areas which have insufficient drainage area to allow storage will be polluted downstream and in 2 other areas low flow augmentation will not be economically feasible and thus polluted conditions are expected to exist in localized areas.

(6/15/62)

The total annual cost of pollution abatement by municipalities and industries by 2000 is estimated to be $2,515,700. This value includes the cost of existing facilities and those needed to meet existing (1960) and projected 1975 and 2000 needs.

PUBLIC HEALTH

INTRODUCTION

This Technical Memorandum is written with the limitation that field data were not available for all phases. Presentation of data in the subject areas of Vector Control and Solid Wastes is based upon published material and on field studies done by the Communicable Disease Center of the Public Health Service. The information is general and portions cannot be applied specifically to the Basin, but their presentation will serve as a guide to the solution of Basin problems as well as broader State and Regional problems.

VECTOR CONTROL

INTRODUCTION

Vector problems and control efforts in the Ochlockonee Basin may be subdivided into two segments--urban and rural. In this study, selected towns in the Basin over 1,000 population were grouped into the urban setting. Most Florida counties in this Basin have vector control programs centered in the towns which are primarily concerned with the control of mosquitoes and secondarily, with flies, rats, and other vectors. Many of these programs are under the administration of the county health department and also include the operation of sanitary landfills. In the rural areas, vector problems (except for 5 to 10-mile range fresh-water flood mosquitoes) are mostly associated with the activities of the farmer who solves them on an individual basis. Exceptions to these are in the mosquito control work of the following Florida counties: Franklin, Gadsden, Leon, Taylor, Wakulla, and Jefferson. Control efforts in these counties are centered in and around urban areas. There are no county-wide vector control programs in Georgia.

For long-range planning concerning land and water uses, emphasis has been given to recommendations that would result in an environment by the years 1975 and 2000 that would require only a minimum of repetitive pesticide application. This will not only minimize the cost of vector control programs to the public but will make them more effective.

EXISTING VECTOR PROBLEMS

Eastern encephalitis ("sleeping sickness") has caused serious losses among horses in the Basin. Mosquito vectors of this highly fatal human and horse disease are most prevalent in the swamps and marshes located close to and along the coast.

Primary locally transmitted malaria has not been reported in Georgia or Florida in recent years. The number of malaria mosquitoes, Anopheles quadrimaculatus, remains about the same in this Basin as in malaria transmission days. Therefore, as long as travelers bring malaria parasites back to this country from malarious areas of the earth, there will remain a danger of malaria transmission. Thus, the continuance of mosquito control efforts coupled with surveillance will still be required for many years. Fresh-water pools and ponds with vegetation are favorite breeding places of malaria mosquitoes.

Typhus fever (flea-borne) was a severe problem in Georgia and

Florida during the 1930's and 1940's. During recent years improved sanitation practices (limiting the domestic rat's food and harborage) and the use of newer rat poisons and flea insecticides have reduced transmission of this disease to low levels. In 1959, only 8 cases of typhus were reported in Georgia. The pest control industry has played an important role in halting typhus transmission in the urban setting. Most of the remaining transmission of this disease appears to take place in rural areas.

There is considerable transmission of various enteric infections by houseflies. Determination of precise case rates is difficult because of many factors, including difficulties of diagnosis and patients not seeking medical help.

Rocky Mountain spotted fever occurs occasionally in Georgia and Florida. An average of 23 cases per year was reported in Georgia during the period 1955-59. Increased use and number of recreational areas and construction of outlying suburban housing areas appear to increase the possibility of American dog ticks transmitting Rocky Mountain spotted fever to humans. It is noteworthy that in the eastern United States the incidence of this disease has been highest among vacationists and picnickers, particularly among women and children.

Conjunctivitis (pink eye), a common disease of younger children, is a considerable problem in the upper half of the Basin and is confined largely to rural areas. One mode of transmission of this disease is by eye gnats (Hippelates). Oviposition of these insects occurs in freshly cultivated or otherwise disturbed soil.

The coastal area of the Ochlockonee Basin with its extensive tidal marshlands is notorious for biting insect problems. In this area, salt-marsh mosquitoes occur in large numbers and cause great annoyance to the residents and visitors to recreational areas. At times these mosquitoes occur in such overwhelming numbers that outdoor activities during the day or night are practically impossible. Large broods of salt-marsh mosquitoes frequently occur following unusually high tides or heavy rains.

Fresh-water swamps, marshes, and low-lying areas that receive floodwater are also important sources of mosquitoes.

Sandflies, dog flies (Stomoxys calcitrans), and other biting insects occasionally occur in great numbers causing extreme annoyance to residents and visitors.

(6/15/62)

Throughout the Basin, numerous small patches of alligatorweed and water hyacinths are found in small ditches and drainage creeks. Both of these obnoxious weeds were introduced into the United States from tropical areas and are spreading except in places where the Florida State Game and Fish Commission is doing control work. Profuse growths of these weeds tend to clog drainage ditches, canals, ponds, etc; creating conditions favorable for malaria mosquitoes. Many other similar aquatic plants are profusely present, especially in the Florida portion of the Basin. Federal programs exist which plan for the eradication of obnoxious weeds.

In urban areas, vector problems are frequently associated with improper disposal of sewage wastes. Severe Culex mosquito problems have developed in the past where communities discharged improperly treated sewage wastes into swampy or impounded areas near town. In about 10 percent of the towns studied, over-flowing septic tanks created ideal places for the breeding of mosquitoes. Waste stabilization ponds are beginning to appear in the Basin and could cause mosquito breeding problems unless they are properly maintained. One such pond which is under construction at Monticello, Florida will receive the effluent of a conventional settling and trickling filter treatment plant.

About 30 percent of the homes in the urban areas do not meet minimum sanitation standards and thus many have associated fly, rat, and mosquito problems. Local directors of sanitation are aware of vector problems in substandard housing together with the need for corrective programs.

Management of water in rural areas gives rise to a variety of insect vector problems. Inadequacies of general drainage construction and maintenance contribute to mosquito breeding. Most small creeks, canals, and drainage ditches receive little or no maintenance. Frequently, individual farmers and towns cannot construct the small mosquito control drainage ditches because of the lack of or clogging of large drainage canals in the county system.

There are numerous farm ponds in this Basin and many more are being constructed each year. Mosquito breeding in farm ponds in Georgia portions of the Basin has not been serious due to present construction and operating procedures. Farm ponds in Florida have considerable aquatic vegetation and thus provide suitable environment for much mosquito breeding.

Irrigation (sprinkler type) is increasing in the Ochlockonee Basin. It is used principally during periods of dry weather for such crops as tobacco and corn, and also for pasture lands. No significant mosquito problems have developed from the proper application of irrigation water to fields.

(6/15/62)

Artesian wells originating in the limestone aquifer of the Coastal Plain produce an alkaline water that is very favorable for the production of malaria mosquitoes. Several of these wells exist in the Basin, and many are flowing. Little information is available concerning mosquito production associated with artesian wells.

Vector problems associated with land resource activities include those related to the production of livestock and poultry.

Hog parlors are beginning to appear in the Southeastern States and a few have appeared in this Basin. A common practice in these parlors is to wash waste accumulations from the concrete floors into an open septic tank and the overflow discharges into the nearest low, swampy area. This method of disposal frequently causes heavy housefly breeding. Hog parlors also may have considerable rat infestations.

Chicken "factories" are also appearing in the Southeast and in the Basin. In these egg factories, the birds are usually kept in small elevated cages, beneath which cones of manure accumulate on dirt floors. Major fly and rodent problems frequently develop where there is poor housekeeping. In another type of egg and chicken factory, the chickens are kept on a deep bed of wood shavings which is removed only occasionally. Waste chicken feed from power conveyors plus the accumulation of manure create favorable breeding places for flies.

The accumulation of solid waste material (principally manure) on farms appears to be increasing, and there is no practical solution for sanitary disposal without creating fly problems. The spreading of such wastes on fields at frequent intervals is frequently very difficult because of crop growing and manpower requirements. Dairy barn liquid wastes when allowed to discharge into nearby pastures sometimes give rise to mosquito problems.

Some fire ant mounds were noted in the lower portion of the Basin, and several counties have or have had chemical control programs. Fire ant stings, although not common in man, may be severe. Fire ant mounds are not only unsightly but are detrimental to agricultural operations. Wildlife and water supplies must be protected in any chemical control programs.

STATUS OF EXISTING PROGRAMS

There is no statewide enabling legislation for mosquito or other vector control districts in Georgia. Adequate legislation of this nature does exist in Florida.

(6/15/62)

Both Georgia and Florida have specific health regulations pertaining to the impounding of water. Permits are issued for the contruction of farm ponds built to comply with State Board of Health regulations. Several county health department directors of sanitation stated that most farm ponds in their areas were constructed in low swampy areas that used to breed many mosquitoes and that these farm ponds greatly reduced mosquito annoyance in the area.

Supportive services for vector control operations include:

1. Surveillance. Health agencies are concerned with a continuing analysis of vector problems to guide the efforts of other activities.

2. Research. The Florida State Board of Health has a large entomological research center at Vero Beach, Florida, which is working on the control of insects affecting human health. Studies on vector control are also being carried on at two Federal Research stations in the Southeast--the Orlando Florida Laboratory of the Entomology Research Division (USDA) and the Technical Development Laboratories of the Communicable Disease Center (PHS), Savannah, Georgia. In Pensacola, Florida, the Public Health Service, in cooperation with the State and local health department, is attempting to eradicate the yellow fever mosquito, Aedes aegypti. Now in its third year of operation, the project is making excellent progress toward the eradication goal. Public education, environmental sanitation, and DDT residual premises spraying are methods being utilized.

3. Technical assistance. Health agencies provide technical assistance to construction and operating agencies in planning and carrying out vector control operations. Local sanitarians give technical advice and assistance to local communities and to individuals.

Present vector control programs in the Basin consist of six countywide vector control programs centered in health departments. Five of these vector programs include sanitary landfill operations and two (Franklin and Wakulla) do some beach larviciding for the control of dog flies. Most of the mosquito control activities are restricted to adulticiding measures.

Monticello, Florida, has a special type of mosquito problem--the breeding of Mansonia perturbans in huge numbers in Lake Miccosukee. This shallow lake is several square miles in size, and is choked with aquatic vegetation of various types. In recent years, a low level dam was installed near U.S. Highway 90. There is no provision for water level management. The nearest portion of the lake to Monticello is 3 miles away. Mansonia annoyance peaks in

Monticello occured in April 1959, July 1959, and May-June 1960. The light trap collection of the night of May 31, 1960, yielded 8,064 female specimens of perturbans.

EXISTING NEEDS

There is a need for more emphasis on larviciding and permanent control measures. Each county needs at least one dragline for mosquito work. Towns in the district should have from one to several year-round mosquito control workers who would inspect for larvae during the mosquito season, apply larvicides to mosquito breeding areas, operate adulticiding machines occasionally when large mosquito infestations occur, and do maintenance and minor ditch construction during winter months. Mosquito control districts are needed in the coastal counties of Franklin, Wakulla, and Taylor. Each district should have one to two draglines in operation now, working up to three units later on after the counties have become more fully developed economically.

Legislative and regulatory needs include:

1 State enabling legislation permitting the establishment of tax-supported vector control districts in any county of Georgia.

2 Regulations to require the control of wasteful flow from artesian wells.

Needs pertaining to surveillance and technical assistance include:

1. Extensive surveys of vector disease occurrence and vector problems.

2. Increased training of local health department personnel in vector control intelligence.

3. Expansion of entomologic and engineering consultative services to agencies, industries, and individuals concerned with water and related land resource development.

Some of the major research needs include:

1. Development of better permanent control techniques in salt marshes that will control mosquitoes, sandflies, and other vectors and at the same time be beneficial to other interests, such as wildlife conservation.

2. Development of better equipment and methods for constructing and maintaining water management ditches.

3. Development of new agricultural and industrial uses for idle coastal land.

4. Improved methods for the sanitary handling of manure and other wastes on livestock and poultry farms including the possible use of stabilization ponds for disposal of wastes and for irrigation and fertilization.

5. Improved design for catch basins so that they do not hold water.

6. Development of new or modified chemical formulations which would overcome insecticide resistance problems and present less danger to water supplies.

7. Development of improved equipment and application techniques for chemical control of vectors in urban areas.

8. Development of better methods of controlling dog flies.

Vector control program needs include:

1. The establishment of mosquito control districts in Franklin, Wakulla, and Taylor Counties, Florida. Each district would need about 3 draglines for permanent control work.

2. The development of countywide water management systems and programs.

3. Increased implementation of Federal programs by State and local interests to eradicate infestations of alligatorweed, water hyacinths, and other obnoxious weeds in the Basin.

4. Extension of the use of sanitary landfills to all towns and counties in the Basin. Many lowlands exist that could be filled profitably using the sanitary landfill method.

State aid to organized mosquito control agencies in Florida has proven very successful. Such aid in Florida includes funds, supplies, services, and equipment. Similar State aid funds and technical assistance are needed in Georgia.

In order that vector control programs will be compatible with multipurpose functions, it is essential that there be coordination between all interests concerned.

POTENTIAL PROBLEMS AND SOLUTIONS

Based on present knowledge, the one vector problem that appears to be on the rise and could be a significant one in the Basin is mosquito-borne encephalitis--both the Eastern and St. Louis strains. Eastern encephalitis has caused serious losses among horses in the Basin. Sooner or later it could cause epidemics among man, as was true in New Jersey in 1959 (this constituted New Jersey's first confirmed human cases, even though it had killed horses there for at least 50 years). The Eastern disease occurs principally in areas with vast fresh-water swamps and salt marshes (Coastal Plain).

St. Louis encephalitis--a human disease-- is not known to have occurred in the Basin, but it has recently been reported in Pinellas County, Florida. This disease presents a threat to communities in the Basin that allow uncontrolled production of Culex mosquitoes.

On the basis of current knowledge concerning mosquito-borne encephalitis, the only feasible approach to control of the disease is a program of prevention--mosquito control for the community, or population groups, and protection against mosquito bites for the individual.

Increases in transmission of enteric infections by houseflies could increase due to changes in agricultural practices together with further "suburbia" development.

COST AND BENEFITS

The principal benefit of any well-organized vector control program is to provide adequate safeguard to public health. This includes freedom of disease and infirmity which is difficult to evaluate in dollars. Recent research studies have shown that permanent brain and motor damage, especially in small children, frequently result from cases of mosquito-borne encephalitis. The prevention of just one death or case of permanent damage would amply justify the amount of money proposed for vector control work in any one of the towns or counties in this Basin.

Another benefit of vector control programs would be acceleration of development and use of waterfront land. It is common knowledge that excessive numbers of salt-marsh mosquitoes, sandflies, dog flies, and other vectors on such land are an impediment to industrial plants, subdivision developments, and recreational areas.

Another benefit would be to provide economic safeguards, particularly with reference to tourism or resort areas. This is exemplified by the 1959 outbreak of Eastern encephalitis in New Jersey.

(6/15/62)

Although this outbreak involved only 33 human cases with 21 deaths during a two-month period, it was estimated that the episode caused a loss to Atlantic City hotels of $2,000,000.

The estimated costs of needed vector control programs are included in Table PH-1. Studies in Chatham County, Georgia, show that the total cost of the mosquito control program is being substantially balanced by reduced costs to families in the purchase of household sprays, aerosol bombs, and repellents.

The estimated costs of rural rat control programs will be balanced several times by savings from rat damage to stored farm products.

AIR POLLUTION

PROBLEMS

The Ochlockonee-St. Marks Basin has only four known sources of industrial air pollution. There are from dust problems connected with mining operations in the Thomasville, Georgia, area, from the operation of a naval stores, and from a cellulose industry in Florida. The industries are located in sparsely populated areas and cause no major public health problem.

Airborne pollen, like in other Basins of the SERB area, causes much discomfort to the general population.

No information is available on municipal or private sources of air pollution in the Georgia portion of the Basin. General information from Florida indicates that municipal air pollution problems are associated with burning garbage and trash dumps and with sewage treatment plants. Commercial laundries often burn soft coal and have smoke problems.

STATUS OF EXISTING PROGRAMS

Public Law 159-84th Congress and its amendments provide for Federal technical services and financial aid to State and local government air pollution control agencies, and other public or private agencies and institutions in the formulation and execution of their air pollution abatement research programs. The Surgeon General of the Public Health Service may (1) encourage cooperative activities by State and local governments for the prevention and abatement of air pollution, (2) collect and disseminate information relating to air pollution and the prevention and abatement thereof, (3) conduct investigations and research and make surveys, and (4) prepare and publish reports and make appropriate recommendations with regard to the control of air pollution.

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TABLE PH 1
VECTOR PROBLEMS AND PROGRAMS
OCHLOCKONEE BASIN

Location and 1960 Population	Vector Problem Degree* 1	2	3	Approximate Annual Cost of Vector Control Program* Present	Needed	Refuse Disposal	Storm Water Drainage Problems	Open Water With Sewage Problems	Comments
GEORGIA									
Boston, Ga. 1,357			M F R T	None	$ 3,000	No organized system	Light	Light	Town needs a refuse collection and disposal system
Cairo, Ga. 7,427		M	F R T	None	10,000	Open dump	Moderate	Light	
Meigs, Ga. 1,236		F	M R T	None	2,500	No organized system	Light	Light	Town needs a refuse collection and disposal system
Thomasville, Ga. 18,246		M	F R T	None	20,000	Sanitary landfill	Moderate	Light	High Aedes aegypti population
FLORIDA									
Monticello, Fla. 2,490	M		F R T	See Jefferson County below		1 modified S.L.F 1 open dump	Light	Moderate	New sewage treatment plant almost ready for operation. Roach problem in catch basins.
Perry, Fla. 8,030		F	M R T	See Taylor County below		Sanitary landfill	Moderate	Light	

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TABLE PH 1
(continued)

Location and 1960 Population	Vector Problem Degree* 1	2	3	Approximate Annual Cost of Vector Control Program* Present	Needed	Refuse Disposal	Storm Water Drainage Problems	Open Water With Sewage Problems	Comments
FLORIDA (con't)									
Quincy, Fla. 8,874		M F R	T	See Gadsden County below		Sanitary landfill	Light	Light	
Tallahassee, Fla. 48,174	M	F	R F	See Leon County below		Sanitary landfill	Moderate	Light	
Franklin County, Fla. 6,576				$23,000	$35,000	Modified county-wide sanitary landfill			Vector program costs include SLF operations.
Gadsden County, Fla. 41,989				5,000	40,000				Vector program costs include SLF operations.
Jefferson County, Fla. 9,543				23,000	75,000				
Liberty County, Fla. 3,138				None	15,000				
Leon County, Fla. 74,225				96,000	125,000	Countywide sanitary landfill			Vector program costs include SLF operations.
Taylor County, Fla. 13,168				13,000	35,000				Vector program costs include SLF operations.
Wakulla County, Fla. 5,257				30,000	60,000				Vector program costs include SLF operations.
TOTALS				190,000	420,500				

*1 - Severe
2 - Moderate
3 - Light

M - Mosquitoes
F - Flies
R - Rats
T - Ticks

*Costs of refuse collection and disposal are not included in this table.

The industrial Hygiene Service, Georgia Department of Public Health, has maintained records of complaints on industrial air pollution problems since 1945. Control measures used have consisted of investigation of these complaints and, where justified, discussion with the offending parties to work out a solution satisfactory to all persons concerned.

Work is underway by the Georgia Department of Public Health Service on a statewide survey to locate all sources of air pollution in Georgia. The survey began January 1, 1961, and as of April 1962 a preliminary draft had been prepared.

The Florida State Board of Health has recently completed a survey of sources of air pollution and has published "A Report on Florida'a Air Resources". The 1957 Florida Air Pollution Control Act established an Air Pollution Control Commission in the State Board of Health and provided for the administrative organization to enforce air pollution control rules and regulations. The Act provides for establishment of air pollution control districts, but as of the present date none are operating in the SERB area. This State survey report, plus adequate enabling legislation for local zoning and air pollution control programs, provides a sound basis for carrying out an active and effective program in Florida.

Both Georgia and Florida State Health Departments cooperate with the Public Health Service in the National Air Sampling Network Program. Urban sampling stations located in the SERB area are Atlanta, Augusta, Savannah, Columbus, and Macon, Georgia. Others are operated just outside the SERB area, but no sampling station is located within the Ochlockonee Basin.

EXISTING NEEDS

Available data indicate a need for control of sources of air pollution in the Basin. Additional data now available or which are being collected on specific pollutants and the extent of pollution will be useful to correct the problems and meet the needs.

In the September 1959 report "Industrial Air Pollution Problems in Georgia", a need was expressed for a comprehensive study of air pollution problems in Georgia. The survey will recommend the type of legislation and programs needed, and suggest the facilities required to implement a control program in Georgia. Industries contributing atmospheric pollution in order of importance include the pulp and paper industry, chemical industry, rendering plants and the kaolin, talc, slate and fuller's earth industry.

It is noted that most of the available data is for industrial sources of air pollution. Corrective measures should be determined

and put in force for municipal, commercial, and individual air polluters also.

POTENTIAL PROBLEMS AND SOLUTIONS

The chemical, naval stores, metals, and food processing industries are the major industries expected to expand production in the Basin during the period 1960-2000. The types of air pollution expected from these industries would include fumes and gases, odors, particulate matter, and smoke. Only the chemical industry is expected to produce problems affecting fairly large areas.

Research has produced methods and devices that will eliminate gases, smoke, and particulate matter from the air. New industry should be required to install air pollution abatement devices and measures should be adopted now to control present polluters of the atmosphere.

Recommendations in "Florida's Air Resources" point out the solution to their State's air pollution problems as:

1. Adoption of legislation to permit and foster establishment and operation of county and multi-county air pollution control programs throughout the State.

2. Review and approval of plans for construction and alteration of establishments which may cause air pollution.

3. Enabling legislation to permit county-wide zoning.

4. Adequate staffing and financing to carry out a program of surveillance, control, assistance, and research in air pollution.

COST AND BENEFITS

The cost of control of air pollution cannot be evaluated since specific quantity and quality information is not available for the sources.

Benefits to be derived from air pollution abatement result from reduction in nuisances, effects on public health, and decrease in maintenance costs of buildings and of personal property. Benefits are considered to be equal to costs of air pollution control.

RADIOLOGICAL HEALTH

PROBLEMS

The radiological health problem is best determined by considering

all of the following sources of radiation: air, water, milk and food, and local sources such as medical and environment. The total effect of these sources is not known for the Ochlockonee Basin.

There are no nuclear reactors in the Basin. There are, however, eight licensed radioactive isotope users in the Tallahassee, Florida, area and one at Thomasville, Georgia.

Data collected by State and Federal agencies on the radiological quality of the Basin's waters are shown in Table PH-2. The results of weekly composite samples of surface water collected by the Public Health Service for the U.S. Study Commission is included.

STATUS OF EXISTING PROGRAMS

The Florida State Board of Health collected 3,500 statewide water samples for radiological analysis during the period March 1958 to October 1960. The sampling program includes surface and ground water sources with permanent sampling stations on each watershed in the State. Progress Report No. 4-"Radiological Surveillance Program, March 1958 through October 1960" summarizes radioactivity in water as follows:

"1. A marked decrease in the radioactivity of surface waters and rainfall became apparent in the late spring of 1959 and continued until the French weapons testing the latter part of February 1960. The activity from this testing dropped off by May 1960 and continues to be undetectable.

2. An increase in the activity of underground water has not been found.

3. A few areas in the state, principally the phosphate ore bearing regions, have shown a little more alpha activity in both surface and underground waters than other portions of the state. This activity is negligible and much below maximum permissible levels."

There are no Federal, State, or local radiological health program activities operating in the Georgia portion of the Basin. The Georgia Department of Public Health plans a surface water monitoring program to gather data on background radioactivity in their streams. Georgia and Florida both wish to assume the job now being done by the Atomic Energy Commission of inspecting the facilities and operations of licensed users of radioisotopes.

Other activities of the States include maintaining a list of Atomic Energy Commission licensed isotope users. Florida surveys sites for industrial users.

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TABLE PH-2
RADIOACTIVITY IN WATER
OCHLOCKONEE BASIN

Sampling Station	Period of Analysis	No. of Analyses	Gross Alpha (uuc/l) Avg.	Max.	Min.	Gross Beta (uuc/l) Avg.	Max.	Min.	Remarks
Florida Surface Waters									
Fenholloway River on Hwy 19, south of Foley	1958-60	5	0.3(2)	0.4	0.3	59.3	200.7	5.5	
Rocky Creek on Hwy 98	1958	1	0.3			27.0			
Econfina River on Hwy 98	1958-60	6	0.5(3)	0.6	0.3	62.7(5)	241.1	8.7	
Aucilla River on Hwy 98	1958-60	7	0.6(4)	1.2	0.1	35.9	182.3	3.0	
Lake Bradford-Tallahassee	1958-60	6	0.2(3)	0.4	0.05	59.9	162.6	3.3	
Lake Miccosukee	1958	2				26.1	40.8	11.4	
Lake Munson-Tallahassee	1958-60	7	1.0(5)	3.2	0 2	60.7	151.8	4.6	
St. Marks River, Tallahassee below Natural Bridge	1959-60	2	0.2	0.3	0.2	4.4	6.7	2.1	
St. Marks River, Tallahassee above Natural Bridge	1959-60	2	0.4(1)			9.5	11.6	7.4	
St. Marks River, Newport	1958-60	6	0.3(3)	0.4	0.3	28.7(5)	101.8	4.3	
Wakulla Springs	1959-60	3	0.5	0.8	0.2	7.0	18.4	1.1	
Wakulla River, Hwy 319	1958	1	0.4			5.5			
Wakulla River, Hwy 19	1958	2	0.02	0.05	0	14.6	24.1	5.2	
Quincy Creek at city limits of Quincy, Hwy 65	1959-60	4	1.5(3)	2.0	0.9	21.2	65.9	2.5	

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TABLE PH-2 (CONT'D)
RADIOACTIVITY IN WATER
OCHLOCKONEE BASIN

Sampling Station	Period of Analysis	No. of Analyses	Gross Alpha (uuc/l) Avg.	Max.	Min.	Gross Beta (uuc/l) Avg.	Max.	Min.	Remarks
Florida Surface Waters (Cont'd)									
Quincy Creek, Quincy Water Intake	1958	1				11.4			
Smith Creek, Ochlockonee River, Hwy 267	1959	1				272.4			
Lake Talquin	1958	2	0.1(1)			21.5	33.0	10.0	
Huckleberry's Creek at Martins Landing	1958	2	0.2(1)			25.3	45.0	5.7	
New River, west on U.S. 98	1959-60	2				30.6	44.6	16.7	
Ochlockonee River, below Lake Talquin Bridge, Hwy 20	1959-60	5	0.5(1)			78.2	316.7	5.7	
Ochlockonee River, U.S. Hwy 90 Bridge	1958-60	6	0.7(4)	1.7	0.1	36.5	127.5	5.6	
Telogia River at Shepards Mill	1958	1	0			10.0			
Telogia River Hwy 20 East of Bristol	1959	1	0.7			55.2			
Florida Ground Waters									
Cross City Municipal Airport	1958-59	2	1.1	2.2	0.1	4.0(1)			Deep well
Telogia Junction Hwys 65 & 67	1959-60	3				4.0(1)			Shallow well

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TABLE PH-2 (CONT'D)
RADIOACTIVITY IN WATER
OCHLOCKONEE BASIN

Sampling Station	Period of Analysis	No. of Analyses	Gross Alpha (uuc/l) Avg.	Max.	Min.	Gross Beta (uuc/l) Avg.	Max.	Min.	Remarks
Florida Ground Waters (Cont'd)									
Quincy Well	1958	1	0.4			3.9			
Carrabelle Well	1958	1				1.3			
Carrabelle Municipal Well, City Hall	1959-60	3	0.6(2)	1.1	0.1	3.5	3.8	3.0	Deep well
Ben Thorpe S/D	1958	1	0.2			2.6			
Cottage Grove S/D	1958	1	0.7			6.4			
Dale Mabry Well	1958	1	0.4			6.7			
Norwood Estates	1958	2	0.1(1)			4.9	5.6	4.3	
Stiles S/D	1958	1				4.3			
Vickers S/D	1958	2	0.2	0.3	0.1	4.4	7.6	1.3	
White Acres S/D	1958	1	0.1			5.6			
Florida-Miscellaneous Sources									
Tallahassee Municipal Water Supply Treated	1960	1	0.2			3.7			
Tallahassee STP, composite	1958-60	9	0.6(1)			11.3	21.4	2.9	
Air Base sewage effluent	1958	2	0.1(1)			5.3	7.1	3.5	

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TABLE PH-2 (CONT'D)
RADIOACTIVITY IN WATER
OCHLOCKONEE BASIN

Sampling Station	Period of Analysis	No. of Analyses	Gross Alpha (uuc/l) Avg.	Max.	Min.	Gross Beta (uuc/l) Avg.	Max.	Min.	Remarks
Georgia Surface Waters									
Ochlockonee River, near Thomasville	1960-61	3	3.2	5.0	0.0	3.8	5.0	2.0	Weekly composite samples by Public Health Service for U.S. Study Commission.

NOTE: Numbers in parentheses show number of analyses upon which the average was computed if different than total number of analyses.

EXISTING NEEDS

The air phase of surveillance has never been undertaken by the States due to lack of funds, personnel, and equipment. Development of this phase of the program is increasingly important.

There is a need for control of radiological health hazards associated with the use and disposal of radioisotopes in the Basin.

Georgia needs additional funds and personnel to enable it to expand the water and air monitoring programs so as to establish a statewide radiation background picture for future use. Assistance is also needed in a surveillance program for radioactive contamination of milk and food supplies.

POTENTIAL PROBLEMS AND SOLUTIONS

It is espected that the use of radioisotopes will increase in the future. Control of their use is a State responsibility. Funds and personnel should be made available that will permit the States to have a balanced and effective program.

Solutions to these problems include the following:

1 Enactment of specific State legislation to control radioactive pollutants and license radioisotope users.

2 Provision of additional funds and personnel for Statewide programs of control and monitoring of air, water, milk, and food supplies.

SOLID WASTES

INTRODUCTION

Most communities collect and dispose of solid wastes as a governmental service, financing the operation by general taxation or by a special service charge. In a few instances, the collection and disposal is left to the individuals producing the waste or to private collectors who charge a fee for the service.

Methods of disposal vary, including dumping (and burning) on the surface, placing in sanitary landfills, and incineration. The annual amount of solid wastes produced on a national average is 0.8 to 1.0 cubic yard or about 650 pounds per person per day (approximately 2 pounds per person per day).

Incineration is considered as one of the best methods of disposal. However, incineration of waste is not economical for small communities since it usually requires a population of 50,000 or more to support an efficient operation.

Sanitary landfills are the best method of waste disposal for any small community having suitable land available within reasonable hauling distance, and they can be used at a cost which is not prohibitive. They are an effective and proven method, accepted by the State departments of health.

PROBLEMS

Open dumps with burning of some garbage and combustible material are the most common method of solid waste handling in the small communities of the Basin. This is not an acceptable method because unburned garbage and uncovered refuse become a major breeding place for insects and rodents, and burning dumps create an extensive smoke and odor problem. Costs ignoring benefits, for dump operations are approximately 50 percent of that for sanitary landfills.

STATUS OF EXISTING PROGRAMS

State and local health departments have adequate authority to control the storage, collection, and disposal of solid wastes. Only five communities in the Basin operate an acceptable type of solid wastes disposal program. Six others operate programs where certain types of wastes are burned at dumps, or the fill is covered at other than daily intervals. Another estimated 10 communities are assumed or known to have inadequate operations for solid wastes disposal.

Acceptable sanitary landfills are found in the cities of Thomasville, Georgia and Monticello, Perry, Quincy, and Tallahassee, Florida. The city of Monticello, however, does operate an unacceptable dump in addition to its landfill. The city of Quincy, Florida handles one-third of the refuse from Gadsden County and City of Greensboro.

Modified landfills which permit some burning and less frequent than daily covering of wastes are operated by six cities in Wakulla County, Florida.

EXISTING NEEDS

There is a need in the Basin to provide approved waste disposal practices in an additional 10 communities which have a population sufficient to support a refuse collection and disposal program. In communities of under 500 population, good housekeeping practices can be practiced by the individual. Most communities will need to adopt regulations to enable them to cope with the problem.

POTENTIAL PROBLEMS AND SOLUTIONS

Large urban areas will find the use of incinerators more practicable where land areas for sanitary landfills are not conveniently available at reasonable costs.

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By 1975 Tallahassee, Florida, will need an incinerator to serve an estimated population of 81,800 persons. In addition there will be 25 sanitary landfill programs serving a total population of 90,900.

By 2000, Tallahassee's incinerator will serve an estimated population of 148,500 persons. In addition, there will be 26 sanitary landfill programs serving a total population of 148,750.

Land requirements for the communities operating sanitary landfills are based on a need of one acre per 10,000 population served per year. These requirements for the period 1960-2000 are shown in Table PH-3.

TABLE PH-3
LAND REQUIREMENTS FOR SANITARY LANDFILLS
OCHLOCKONEE BASIN

Period of Time	Number of Communities	Avg. Population to be Served	Acres Required
1960-1964	21	98,000	43*
1965-1974	25	101,000	101
1975-2000	26	119,650	300
		TOTAL	444

* Does not include land requirements for modified landfills.

NOTE: Tallahassee, Florida has been considered to be served by an incinerator from 1975.

COSTS AND BENEFITS

Present costs for construction of incinerators ranges from $2,000 to $4,000 per ton daily capacity. Operational costs vary considerably with the City of Atlanta reporting $1.48 per ton for the year 1959, and $1.27 per ton for 1960. Other cities report costs two to three times this amount.

Costs of operation of sanitary landfills average $0.50 to $1.00 per ton of refuse handled. Cities as large as Los Angeles, California, and New York City use this method of disposal. New York City's experience has shown that disposal by sanitary landfills costs approximately half that of incinerators.

Cost of operation of a solid refuse program including collection and disposal will vary with each community but will, depending on the size of the community, range from $1.00 to $4.50 per person per year. Based on a scaled cost, annual cost for a solid refuse program in the Ochlockonee Basin are shown in Table PH-4.

TABLE PH-4
SOLID WASTES PROGRAM ANNUAL COSTS
OCHLOCKONEE BASIN

Type of Operation	1960	1965	1975	2000
Incineration				
Capital costs	--	--	16,510	29,200
Operation and Maintenance	--	--	81,800	148,500
Replacement	--	--	5,590	10,000
Sanitary Landfills				
Collection and Disposal	153,000	253,000	218,600	319,300
TOTALS	$153,000	$253,000	$322,500	$507,000

The capital investment for incinerators is estimated to be $340,000 in 1975 and $600,000 in the year 2000. Operation and maintenance annual costs for the incinerator program are based on $1.00 per person served. The total cost for the sanitary landfill program is considered to be all operation and maintenance. All operation and maintenance costs include collection as well as disposal of the solid refuse.

SUMMARY AND CONCLUSIONS

SUMMARY

Insect-borne diseases do not now constitute a major health problem in the Basin. The following diseases, however, do present a continuous threat: encephalitis, malaria, typhus fever, Rocky Mountain spotted fever, and conjunctivitis. The most serious insect problems in the Basin are the salt-marsh mosquitoes in seashore counties.

Important vector problems due to man's activities include those associated with the disposal of sewage, the storage, collection and disposal of refuse, water-holding catch basins, uncontrolled flow from

artesian wells, and the accumulation and disposal of feed wastes and manure on farms.

There is no statewide enabling legislation for vector control districts in Georgia, but adequate legislation of this nature does exist in Florida.

Present vector control programs consist of six county-wide vector control programs in Florida, four of which include excellent sanitary landfill operations in addition to one in Georgia. These programs are primarily for the control of mosquitoes and secondarily to control horse flies, dog flies, rats, and other vectors.

Only four minor sources of air pollution are present in the Basin, and there are a number of other small local municipal and commercial sources. Studies have been completed on all sources of air pollution in Georgia and Florida.

The overall extent of the radiological health problem has not been determined. Air, water, and other monitoring programs are underway in Florida and to a lesser degree in Georgia. No problem areas have been found as a result of these limited monitoring activities, but slight increases in alpha activity in phosphate ore bearing regions has been noted.

Only five communities have satisfactory sanitary landfills for solid wastes disposal. There are presently 16 communities in the Basin over 500 population which have inadequate solid wastes handling programs.

CONCLUSIONS

Control measures and supportive services needed to reduce public health problems associated with insect and rodent vectors are:

1. State enabling legislation permitting the establishment of tax supported vector control districts in any county of Georgia.

2. Regulations requiring the control of wasteful flow from abandoned artesian wells.

3. More extensive surveys of vector disease occurrence and vector problems.

4. Increased training of local health department personnel in vector control intelligence.

5. Expansion of entomologic and engineering consultative services to agencies, industries, and individuals concerned with water and land resource developments.

6. Development of better permenent control techniques in salt marshes to serve multi-interests.

7. Development of better equipment and methods for construcing and maintaining water management ditches.

8. Establishment of mosquito control districts in Franklin, Wakulla, and Taylor Counties, Florida.

9. Development of countywide water management systems and programs.

10. Improved design for catch basins so that they do not hold water.

11. Increased use of sanitary landfills in towns and in counties, and use of countywide refuse collection systems.

12. Increased use of sewers and central treatment plants in lieu of septic tanks in new subdivisions.

13. Development of improved methods for the sanitary handling of manure and other wastes on livestock and poultry farms.

14. Implementation of an increased program for the control and progressive eradication of alligatorweed, water hyacinths, and other obnoxious weeds in the Basin.

15. Better coordination between agencies so that vector control programs are compatible with multipurpose functions.

16. Establishment of countywide rodent control programs where none exist.

17. Development of effective techniques for the control of eye gnats, and improved methods for control of dog flies.

18. Initiation of a state-aid financial program in Georgia.

Based on present knowledge, a vector problem that appears to be on the rise and could be a significant one in the Basin in 1975 or 2000 is mosquito-borne encephalitis. The only feasible approach now to control of encephalitis is a program of prevention--mosquito control for the community (or population groups) and protection against mosquito bites for the individual. Adequate housefly control is needed to eliminate the transmission of enteric diseases by the vector route.

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The statewide air pollution survey recently completed in Georgia and the completed survey in Florida should be utilized as a basis for planning programs in those two states. Study and research should be undertaken immediately to determine the feasibility and desirability of controlling air pollution from the processing of pulp and the manufacturing of wood product materials. Since the economy of controlling this particular source of air pollution is closely related with the control of water pollution from this industry, the two programs should be coordinated. Control measures in the large urban areas of the Basin should be strengthened.

Funds are needed for the expansion of the radiological monitoring program in Georgia and to a lesser degree in Florida. This surveillance program on water, air, milk and food, and related items is essential in this nuclear age.

Satisfactory solid wastes programs should be started immediately in 10 Georgia and Florida communities in the Basin. Funds for such a program ($1.00-$2.50 annually per person) could be obtained through local taxation. Six other cities operating modified sanitary landfills should improve their operations. Estimated annual costs of providing adequate refuse collection and disposal programs for 1965, 1975, and 2000 are $253,000, $322,500, and $507,000 respectively. This includes the cost of an incinerator program for Tallahassee in 1975 and 2000.

APPENDICES AND BIBLIOGRAPHY

APPENDIX
DEFINITIONS AND ABBREVIATIONS

1. cfs - cubic feet per second.
2. Garbage - putrescible animal and vegetable wastes resulting from the handling, preparation and consumption of foods.
3. gpcd - gallons per capita per day.
4. gpd - gallons per day.
5. mg - million gallons.
6. mgd - million gallons per day.
7. PE - population equivalent.
8. ppm - parts per million by weight.
9. Pollution, water - the addition of sewage, industrial wastes, or other harmful or objectionable material to water.
10. Quality, water - is defined as the expression of water characteristics in terms of its physical, chemical, bacteriological, biological, and radioactive content.
11. Resources, water - is defined as the water available to serve mankind and his civilization for the varied, complex, and often conflicting beneficial uses. These uses include sources for municipal and domestic supplies, agriculture, industrial development, and for recreation, propagation of aquatic life and other forms of wildlife, navigation and ultimate waste disposal.
12. Supplies, domestic water - are those supplies used for individual families, including those also serving tenant families living on the property. Domestic supplies do not include commercial establishments, schools, churches, or camps.
13. Supplies, industrial water - are considered as industrially owned supplies, primarily developed for process or cooling purposes but which might be incidentally used for sanitary purposes.
14. Supplies, municipal water - are public supplies serving a municipality or communities of 50 or more people.
15. Supplies, semi-public water - are supplies for schools, motels, camps, and other supplies serving water to the public; or commercial establishments not classed as municipal or industrial.
16. Wastes, municipal - include all liquid wastes received by community sewers.
17. Wastes, industrial - the liquid wastes from industrial processes as distinct from domestic or sanitary sewage.
18. Wastes, solid (or Refuse) - includes all wastes of a solid nature not otherwise disposed of to the sewers or to the atmosphere. This includes all putrescible and nonputrescible solid wastes such as garbage, rubbish, ashes, street cleanings, dead animals, abandoned automobiles, and solid market and industrial wastes.
19. Wastes stabilization ponds - a properly engineered and operated pond for the biological reduction of organic wastes.

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20. Water supply systems - includes the works and auxiliaries for collection, treatment and distribution of the water from the source of supply to the free-flowing outlet of the ultimate consumer.

Note: For the definition of any other terms which are used in this memoranda, refer to Glossary of Water and Sewage Control Engineering, 1949, American Society of Civil Engineers.

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